

INVENTORY OF BOTANICAL NATURAL AREAS
IN
BERKELEY, CHARLESTON AND DORCHESTER COUNTIES

by

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Submitted to

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FINAL REPORT

INVENTORY OF BOTANICAL NATURAL AREAS
IN
BERKELEY, CHARLESTON AND DORCHESTER COUNTIES

by

Richard D. Porcher

This study of botanical natural areas in Berkeley, Charleston and Dorchester counties, South Carolina, was funded by the Charleston Harbor Project. Work was begun in June of 1993 and completed in March of 1995. The material included in this Final Report was collected solely by the investigator. Two copies of the Final Report are provided the CHP.

Part I. Study Objectives:

The objective of this study was to inventory significant botanical natural areas in the Tri-county area that may be impacted by activities related to Charleston Harbor and related waterways. In addition, significant sites are listed where are located artifacts from the rice growing era that are associated with the Cooper River and associated waterways in the Tri-county area.

Part II. Methods:

The study area includes portions of three counties: Berkeley, Charleston and Dorchester. This study area was determined by staff of the Charleston Harbor Project and provided the investigator; it is delineated in the map found in Appendix 1. Investigator, however, was given considerable latitude to go outside the study area to include significant sites he felt should be included. Several sites are included that lie just outside the study area boundary given in Appendix 1.

Sites listed in the Results were obtained from the following sources: (a) the investigator's knowledge of the study area; (b) consultation with professional colleagues; (c) the literature; and

(d) field surveys associated with the project. Eighty sites in the Tri-county are considered significant; nine of these sites are associated, at least in part, to the rice industry.

The following criteria were used to select sites of significance:

1. Plants listed as Endangered by the United States Fish and Wildlife Service. Two plants listed by Fish and Wildlife as endangered species (Federal Register, August 1993) are known to occur in the study area: *Schwalbea americana* L., American chaffseed, and *Lindera melissifolia* (Walter) Blume, pondberry. All known sites for these two species in the study area are included in the Results. Two other species of vascular plants are listed as endangered but have never been reported in the study area and no sites were found during the study. These two species are *Amaranthus pumilus* and *Oxypolis canbyi*.

2. Plants listed as Category 2 species by Fish and Wildlife Service (Federal Register, September 1993). These are plants for which information now in possession of the Service indicates that proposing to list as endangered or threatened is possibly appropriate, but for which sufficient data on biological vulnerability or threats are not currently available to support proposed rules. Category 2 species found in the study area or Category 2 species likely to occur in the study area are listed below. Sites that harbor these species are listed in the Results.

Sites that harbor pondspice (*Litsea aestivalis*) were not included because current opinion among botanists is that pondspice is not rare and will be removed from consideration for listing in the future. I have found it in approximately twenty-five sites in the Francis Marion National Forest.

Agrimonia incisa T. & G., incised groovebur
Asplenium heteroresiliens Wagner, Wagner's spleenwort
Carex chapmanii Steudel, Chapman's sedge
Eulophia (*Pteroglossaspis*) *ecristata*, spiked medusa
Ilex amelanchier M. A. Curtis, sarvis holly
Litsea aestivalis (L.) Fernald, pondspice
Lobelia boykinii T. & G., Boykin's lobelia.
Myriophyllum laxum Shuttlew. ex Chapman, loose watermilfoil
Narthecium americanum Ker, bog asphodel
Parnassia caroliniana Michaux, Carolina grass-of-parnassus
Plantago sparsiflora Michaux, pineland plantain
Rhexia aristosa Britton, awned meadow-beauty.
Thalictrum subrotundum Boivin, meadow rue
Trillium pusillum Michaux var. *pusillum*, Carolina trillium

3. Rare Plant Communities. Certain plant communities, such as marl forests and longleaf pine savannas, are rare in the study area and the state. This rarity either results from natural rareness or loss of communities because of man's activities. Preservation of these rare communities is critical to preserve natural diversity.

4. Significant Wetlands. The Tri-county area harbors many wetland habitats that the investigator considers significant above just being a wetland.

5. Wilderness Areas. The significance of these areas has already been determined since they have been granted protective status as National Wilderness Areas. Four Wilderness Areas occur in the study, all in the Francis Marion National Forest. Each has been included in the Results.

6. Significant sites with artifacts from the rice culture era of South Carolina. Investigator has determined, through ten years of field surveys, that approximately 95% of the artifacts remaining from the rice industry of South Carolina (1685-1911) have been lost. Sites considered to have historical value in preserving the history of the rice industry are included in the Results.

7. Pristine sites of unusual natural beauty. The study area in the Tri-county area is laced with sites of unusual natural beauty that should be preserved for future generations to enjoy. Penny Creek is such a site. This blackwater, coastal tidal creek is perfect to canoe down. It passes through abandoned rice fields that again harbor bald cypress swamp forests and a wide variety of wildlife. Selected sites such as Penny Creek have been listed in the Results.

Part III. Results:

Eighty sites in the study area are considered significant and are grouped according to counties. Within each county, the sites are grouped according to the topographic map on which they occur. For each site the following data is included:

- a. Site name. Most of the site names were given by the investigator.
- b. Associated waterway(s). The nearest waterway(s) to each site were obtained from topographic maps.
- c. Ownership. The ownership of the site is given when it could be determined.
- d. Description. The description is a brief statement of the natural features and significance of the site and is derived from the investigators' knowledge of the site and from the literature.
- e. Significance. This includes a brief statement why the site is deemed significant.
- f. Voucher specimens. A specimen citation is given for endangered and C2 species for each site in which they occur when specimens are on deposit in a herbarium.
- g. References. Investigator has listed all the references that pertain to the individual site. References that are actually cited are included in the Literature Cited (Section VI).
- h. Photographs. For the majority of sites, a color slide(s) is included that depicts either the entire site or that is representative of the site, or shows the most significant feature of the site. The color slides are located in Appendix 5.

Each natural area has been delineated onto a section of a topo map and included in Appendix 2. In many cases the boundry lines only approximate the real property line. Someone using this Final Report should secure maps with the correct property lines if the actual property line must be used for a survey.

BERKELEY COUNTY

Quadrangle: Betheria, S.C.

Site 1: Huger Creek Beech Forest
Associated Waterways: Huger, Turkey and Nicholson Creeks
Ownership: United States Forest Service
Description:

Mature beech forests are rare in the coastal area. One of the most well developed beech forests in the coastal area occurred along Huger Creek. Porcher (1982) identified over a hundred species of vascular plants in this beech forest, including numerous rare species. This forest, because of its dense overstory, had a sparse shrub layer, making it ideal for wildflower walks. The spring ephemerals were especially abundant, with species such as bloodroot, may-apple, green-and-gold and trillium common. A rare orchid, three birds orchid, was found in the beech woods, only the second location in the coastal area (Porcher, 1977).

Hurricane Hugo removed most of the canopy and a dense understory has developed, making ingress almost impossible. However, there are still stands of mature trees, providing enough shade to allow the herbs to survive. In time, the forest will regenerate since it is a coppice community. Its protection now will one day provide persons the pleasure of one of the most significant wildflower sites in the coastal area.

Significance:

Beech forest with many wildflowers and numerous rare, coastal plants.

References:

Porcher, Richard D. 1977. The rediscovery of *Triphora trianthophora*, three birds orchid, in the Coastal Plain of S. C. *Castanea* 43:172-74.

_____. 1982. Inventory of Natural Areas in the Francis Marion National Forest.

Final Report. Atlanta: United States Forest Service, Regional Office.

_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Photographs:

1. Huger Creek Beech Forest before Hurricane Hugo
2. Huger Creek Beech Forest after Hurricane Hugo

Site 2: Midway Reserve
Associated Waterway: Alligator Creek
Ownership: Private
Description:

Midway Reserve was an inland rice field historically owned by the Ball Family of the Cooper River area. It is a Carolina bay converted into rice fields in the early 1700's. Part of the water supply to flood the reserve came from Alligator Creek. Aerial photographs reveal a complex system of dikes and canals associated with rice growing. The reserve today is part of Midway Plantation owned by several men from Charleston. The original reserve consisted of 400 acres. In the 1950's, 250 acres were planted in pine and the remaining 150 acres maintained as

wetland habitat for waterfowl. This wetland habitat consists of a variety of communities including freshwater marsh, floating aquatics, floating mats and swamp forest. The floating mats are unusual and were first described by Hunt (1943). The swamp forest is a mix of wetland trees: red maple, swamp gum, pond cypress, bald cypress and tupelo gum.

Midway Plantation comprises 1500 acres; the entire plantation is maintained as a wildlife habitat.

Significance:

Wetland habitats, Carolina bay, rare plants and former inland rice fields with associated banks and canals.

References:

Carney, Judith, and Richard D. Porcher. 1993. Geographies of the Past: Rice, Slaves and Technological Transfer in South Carolina. *Southeastern Geographer* Vol. XXXIII (2): 127-147.

Hawley, N. R. 1949. The old rice plantations in and around the Santee Experimental Forest. *Agricultural History* 23:86-91.

Hunt, K. W. 1943. Floating mats on a southeastern coastal plain reservoir. *Torrey Botanical Club Bulletin* 70:481-88.

Site 3: Limerick Rice Mill and Inland Rice Fields

Associated Waterway: Gough Creek

Ownership: United States Forest Service

Description:

Lees (1980) gives an account of the water-powered rice mill established at Limerick Plantation in 1795: "For power, the mill used water from a reserve located some distance from the mill, and which was channeled to it by a canal passing through several upland rice fields." Although there are remains of other water-powered mills in the coastal area (Richard D. Porcher, unpublished field notes), this is the only one in which the date has been documented and in which general information about its operation is known. The remains of the sluice-way in which water flowed from the reserve to turn the water-wheel can still be seen. Also, the system of banks that formed the inland fields and reserve can still be followed. It is difficult, however, to do much field work in the area because of the felled trees from Hurricane Hugo and the resulting development of dense underbrush.

Workers at the nearby Santee Experimental Station removed a mill-stone from the site and have it on display at the station.

Significance:

Remains of historic water-powered rice pounding mill and associated inland fields and reserve.

References:

Hawley, N. R. 1949. The old rice plantations in and around the Santee Experimental Forest. *Agricultural History* 23:86-91.

Lees, William B. 1980. Limerick: Old and In the Way: Archeological Investigations at Limerick Plantation, Berkeley County, South Carolina. *Anthropological Studies*

#5, Institute of Archeology and Anthropology, University of South Carolina, Columbia.

Photograph:

3. Remains of Undershot Sluice-way of Limerick Rice Mill

Site 4: Poplar Dam

Associated Waterways: Turkey Creek, Nicholson Creek and Huger Creek

Ownership: United States Forest Service, Santee Experimental Forest

Description:

Poplar Dam is an earthen bank created to form the lower bank of a reservoir to hold water for an adjacent inland rice field. The bank blocked the flow of water in Turkey Creek. An upper bank at Rock Hole formed the upper limit of the reservoir. Below Poplar Dam an extensive system of banks and flanking canals formed the inland rice fields. I made a survey of this inland system in 1982 (Porcher, 1982). It represents one of only three inland rice fields in the coastal region that have been mapped (the other two are The Bluff Plantation and Tea Farm, sites included in this Report).

Hurricane Hugo leveled the forested wetland within the inland rice field; this forest was a secondary forest that developed after the inland rice method was abandoned. The Forest Service is allowing this forest to regenerate; Poplar Dam is also a protected area.

Flanking Turkey Creek on the northeast side was a mature and well-developed beech woods. Hurricane Hugo also leveled this forest. The Forest Service is allowing this community to regenerate, and since it is a coppice forest, in two-three decades it will again be an excellent example of a beech forest, which is rare in the coastal region.

Poplar Dam and its associated forests, before Hurricane Hugo, was a significant natural and historical area. In time, it will again be so.

An excellent account of the inland rice fields of the Santee Experimental Forest is given by Hawley (1949).

Significance:

Historical inland rice field and associated beech woods.

References:

Hawley, N. R. 1949. The old rice plantations in and around the Santee Experimental Forest. *Agricultural History* 23:86-91.

Porcher, Richard D. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.

_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest

Service.

Photograph:

4. Poplar Dam

Site 5: Three Mile Head Road Schwalbea

Associated Waterways: Alligator Creek; Little Hellhole Reserve

Ownership: United States Forest Service

Description:

This site is a longleaf pine flatwoods community with a population of American chaffseed (*Schwalbea americana*), a Federally Endangered Species. The population is being used for a study of the biology of chaffseed by the author; the study is supported by the United States Fish and Wildlife Service.

Voucher:

Schwalbea americana L.; Richard D. Porcher #1536; 7 May, 1979; The Citadel Herbarium.

Significance:

Site for American chaffseed, a Federally Endangered Species.

References:

- Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.
- Porcher, Richard D. 1980. Inventory of Populations of Proposed Endangered and Threatened Species of Vascular Plants on the Francis Marion National Forest in Berkeley and Charleston Counties. Final Report for Contract #53-43ZP-8-00008. Atlanta: United States Forest Service, Regional Office.
- _____. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.
- _____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.
- _____. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.
- _____. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Site 6: Little Hellhole Reserve *Schwalbea*

Associated Waterways: Alligator Creek; Little Hellhole Reserve

Ownership: United States Forest Service

Description:

This chaffseed population was found in 1993. It occurs along a dirt road leading to private land within the Francis Marion National Forest. Approximately ten plants occur in a longleaf pine flatwoods. The population is small and the plants are robust.

Significance:

Site for American chaffseed, a Federally Endangered Species.

Voucher:

Schwalbea americana L.; Richard D. Porcher #2350; 22 June, 1994; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Porcher, Richard D. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Site 7: Big Ocean Bay Natural Area
Associated Waterway: Walleye Bay
Ownership: United States Forest Service
Description:

Big Ocean Bay Natural Area consists of two Carolina bays. Porcher (1966) designated the smaller of the two bays Little Ocean Bay. When the Forest Service designated the area a Natural Area, Little Ocean Bay was lumped with the larger bay as Big Ocean Bay Natural Area.

Little Ocean Bay is a perfectly formed, oval-shaped Carolina bay dominated by a low pocosin community. The sand ridge on its southeastern side harbors a xeric community. Leather-leaf (*Cassandra calyculata*), a rare member of the heath family, occurs in the interior of the bay. Little Ocean Bay also harbors numerous species of carnivorous plants and orchids along its border and interior.

Big Ocean Bay consists of the pocosin community around the edge and a pond cypress swamp forest in the interior.

Significance:

Carolina bays, rare plants, wetland habitat and pocosin.

Voucher:

Cassandra calyculata (L.) D. Don; Richard D. Porcher #2311; Spring, 1992; The Citadel Herbarium.

References:

Porcher, Richard D. 1966. A Floristic Study of the Vascular Plants in Nine Selected Carolina Bays in Berkeley County, S.C. Master's Thesis, University of South Carolina.

_____. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.

_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Savage, Henry. 1982. The Mysterious Carolina Bays. Columbia: University of South Carolina Press.

Photographs:

5. Aerial of Little Ocean Bay
6. Pocosin Community in Little Ocean Bay

Quadrangle: Cainhoy, S.C.

Site 8: Green Bay Pond Cypress Savanna

Associated Waterway: French Quarter Creek

Ownership: Private

Description:

Pond cypress savannas are rare in the coastal area. The savanna at Green Bay is privately owned and its integrity is threatened by homesites encroaching into the bay. Green Bay Savanna is one of the best examples of this community in the Tri-county area and harbors numerous showy wildflowers, including awned meadow-beauty (*Rhexia aristosa*, Photograph 8) listed as a Category 2 species by the Fish and Wildlife Service. This is a fire maintained community and appears to be burned on a regular basis.

Significance:

Rare community, wildflower site and habitat for *Rhexia aristosa*, a Category 2 plant.

Voucher:

Rhexia aristosa Britton; Richard D. Porcher #2333; 20 July, 1993; The Citadel Herbarium.

References:

Federal Register. Plant Taxa for Listing as Endangered or Threatened Species: Notice of Review. Vol. 58, No. 188. September 30, 1993.

Nelson, John B. 1986. The Natural Communities of South Carolina. Columbia: South Carolina Wildlife and Marine Resources Department.

Photographs:

7. Green Pond Bay Pond Cypress Savanna, February 1995

8. Awned Meadow-beauty (*Rhexia aristosa*)

Site 9: Forest Route 229 (French Quarter Creek Road) Schwalbea

Associated Waterway: French Quarter Creek

Ownership: United States Forest Service

Description:

This population was originally found in 1979 by Richard D. Porcher. Over the years the population has declined and now only a few plants are present. The habitat is a regularly burned, sandy, longleaf pine flatwoods community. Plants occur on both sides of the road, more commonly along the road bank.

Significance:

Site for American chaffseed, a Federally Endangered Species.

Voucher:

Schwalbea americana L.; Richard D. Porcher #1532a; 2 May, 1979; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Porcher, Richard D. 1980. Inventory of Populations of Proposed Endangered and Threatened Species of Vascular Plants on the Francis Marion National Forest in

- Berkeley and Charleston Counties. Final Report for Contract #53-43ZP-8-00008. Atlanta: United States Forest Service, Regional Office.
- _____. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.
- _____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: U. S. Forest Service.
- _____. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.
- _____. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Photographs:

9. Longleaf Flatwoods along Forest Route 229, February 1995, Site for Chaffseed
10. American Chaffseed (*Schwalbea americana*)

Site 10: Cainhoy Lindera Transplant Complex
Associated Waterway: French Quarter Creek
Ownership: United States Forest Service
Description:

Cainhoy Lindera Complex represents a site for two Federally Endangered Species: American chaffseed (*Schwalbea americana*) and pondberry (*Lindera melissifolia*). Two communities occur at the site, longleaf pine flatwoods and a swamp gum savanna. Pondberry was transplanted into the site as part of a research program conducted by the author and supported by the United States Fish and Wildlife Service. Two years after the transplanting, pond berry is surviving and appears to be robust. The population of chaffseed is small; twelve plants were found in 1993.

In January of 1995, an ecology class at The Citadel, transplanted approximately 70 rhizomes of pondberry as a class exercise. Future ecology classes will monitor the experiment to determine if pondberry populations can be established from rhizomes.

Significance:

Site for two Federally Endangered Species.

Vouchers:

Lindera melissifolia (Walter) Blume; Richard D. Porcher #2394; The Citadel Herbarium.

Schwalbea americana L.; Richard D. Porcher #2349; 21 June, 1994; The Citadel Herbarium.

References:

- Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.
- Porcher, Richard D. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

_____. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Photographs:

11. Longleaf Pine Flatwoods with Chaffseed, Cainhoy Lindera Transplant Complex
12. Clump of Transplanted Lindera, Cainhoy Lindera Transplant Complex

Site 11: Cainhoy Pond Cypress-Lindera Complex

Associated Waterway: Flag Creek

Ownership: United States Forest Service

Description:

This site is a pond cypress savanna bordered by a zone of fetterbush. A small population of pond berry (*Lindera melissifolia*, Photograph 14), a Federally Endangered Species, occurs on the southwest side of the depression. It is an isolated, upland swamp forest within a longleaf pine flatwoods community.

Significance:

Wetland habitat and site for pondberry, a Federally Endangered Species.

Voucher:

Lindera melissifolia (Walter) Blume; Richard D. Porcher #2312; 21 May, 1992; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Porcher, Richard D. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Photographs:

13. Pond Cypress Savanna, Site for Pondberry, Cainhoy Pond Cypress-Lindera Complex
14. Pondberry (*Lindera melissifolia*)

Site 12: Lookout Tower Pond Cypress Complex

Associated Waterway: Flag Creek

Ownership: United States Forest Service

Description:

Three wetland communities and one upland community comprise this site. The upland community is a sandy, longleaf pine flatwood community. Growing in the flatwoods on the northwest side of the adjacent depression is a population of incised groovebur (*Agrimonia incisa*), a candidate for endangered status and presently a U. S. Fish and Wildlife Service Category 2 species. There are only three known populations of incised groovebur in the state; thus, this population is significant and more so if it becomes a listed species. A fourth population of groovebur in the FMNF was probably lost to Hurricane Hugo (Porcher, 1991).

The wetland habitats are a longleaf pine savanna, a pond cypress swamp forest and a pond cypress savanna.

Significance:

Site for incised groovebur, a candidate species for endangered status and wetland habitats, including longleaf pine savanna.

Voucher:

Agrimonia incisa T. & G.; Richard D. Porcher #2336; 3 August, 1993; The Citadel Herbarium.

References:

Federal Register. Plant Taxa for Listing as Endangered or Threatened Species: Notice of Review. Vol. 58, No. 188. September 30, 1993.

Porcher, Richard D. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

_____. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Site 13: Highway 41 Pond Cypress Complex

Associated Waterway: None

Ownership: United States Forest Service

Description:

This site consists of a pond cypress swamp forest and a pond cypress savanna along S.C. Highway 41. A small population of pond berry (about 20 stems in 1991 when discovered by the author) occurs on the northwest edge of the complex.

Significance:

Site for pondberry, a Federally Endangered Species and two wetland habitats.

Voucher:

Lindera melissifolia (Walter) Blume; Richard D. Porcher #2391; 29 September, 1994; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Porcher, Richard D. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Photograph:

15. Highway 41 Pond Cypress Complex, Site for Pondberry

Site 14: Hoover Road Lindera/pitcher-plant Bog

Associated Waterway: French Quarter Creek

Ownership: United States Forest Service

Description:

This site in the FMNF is a pond cypress swamp forest in a depression within a pine flatwoods community. It was described in detail as part of an inventory of the FMNF (Porcher,

1982). It harbors on its southeast side a population of *Lindera melissifolia*, a Federally Endangered Species. It is a wetland habitat and harbors numerous rare and botanically interesting species of vascular plants.

Significance:

Wetland habitat, Federally Endangered Species and rare plants.

Voucher:

Lindera melissifolia (Walter) Blume; Richard D. Porcher #2001a; 27 May, 1982; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Porcher, Richard D. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.

_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

_____. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

_____. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Photograph:

16. Pond Cypress Swamp Forest, Hoover Road *Lindera*/pitcher-plant Bog

Site 15: Hoover Road Pond Cypress Savanna

Associated Waterway: French Quarter Creek

Ownership: United States Forest Service

Description:

Hoover Road Savanna is a pond cypress savanna in a depression within a pine flatwoods community; it is an isolated wetland. In Sept. of 1992, a population of pondberry (*Lindera melissifolia*), a Federally Endangered Species, was transplanted into the savanna as part of a study between the United States Forest Service and United States Fish and Wildlife (Porcher, 1994). The population has survived the transplant and is now established. It was checked last in the spring of 1994.

The pond cypress savanna is a significant community. It is an isolated wetland system with numerous rare and showy flowering plants.

Significance:

Isolated wetland system and site for pondberry, a Federally Endangered Species.

Voucher:

Lindera melissifolia (Walter) Blume; Richard D. Porcher #2392; 29 September, 1994; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Porcher, Richard D. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.
_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.
_____. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.
_____. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Photograph:

17. Hoover Road Pond Cypress Savanna, March 1990

Site 16: Brick Church Road *Lindera melissifolia*
Associated Waterways: Flagg Creek, Pepper Gully and French Quarter Creek
Ownership: United States Forest Service
Description:

These two sites are small, isolated depressions within longleaf pine flatwoods. Both contain populations of pondberry (*Lindera melissifolia*), a Federally Endangered Species. These sites are additionally significant because they expanded the habitat in which pondberry is known to occur. Previously, pondberry was associated with lime sinks; Porcher (1982) first reported pondberry in shallow pineland depressions.

Significance:

Sites for pondberry, a Federally Endangered Species.

Voucher:

Lindera melissifolia (Walter) Blume); Richard D. Porcher #1562a; Berkeley County, South Carolina; 23 August, 1979; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.
U.S. Fish and Wildlife Service. 1990. Pondberry Technical Draft Recovery Plan. Atlanta, GA. 52 pp.
Porcher, Richard D. 1980. Inventory of Populations of Proposed Endangered and Threatened Species of Vascular Plants on the Francis Marion National Forest in Berkeley and Charleston Counties. Final Report for Contract #53-43ZP-8-00008. Atlanta: United States Forest Service, Regional Office.
_____. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.
_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

_____. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Photograph:

18. Pineland Depression with Pondberry, Brick Church Road *Lindera melissifolia*

Site 17: Highway 41 Community Complex

Associated Waterway: French Quarter Creek

Ownership: United States Forest Service

Description:

Three communities comprise this site: longleaf pine flatwoods, longleaf pine savanna and pond cypress-pond pine-swamp gum depression. A population of American chaffseed (*Schwalbea americana*), a Federally Endangered Species, occurs in the flatwoods. This population is being used by the author to study the effects of fire on chaffseed (Porcher 1994). The site also harbors a rich mix of wildflowers including numerous orchids and carnivorous plants. *Eulophia ecristata*, a native orchid listed as a Category 2 species by the U. S. Fish and Wildlife Service, was found in the site once; it has not been observed since the original siting. This is common for species of orchids; they bloom one year and then may not bloom again for years.

Significance:

Site for Federally Endangered Species, wildflowers and Category 2 species.

Vouchers:

- a. *Schwalbea americana* L.; Richard D. Porcher #1937; 1981; The Citadel Herbarium.
- b. *Eulophia ecristata* (Fernald) Ames; Richard D. Porcher #714; 18 August, 1973; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Federal Register. Plant Taxa for Listing as Endangered or Threatened Species: Notice of Review. Vol. 58, No. 188. September 30, 1993.

Porcher, Richard D. 1980. Inventory of Populations of Proposed Endangered and Threatened Species of Vascular Plants on the Francis Marion National Forest in Berkeley and Charleston Counties. Final Report for Contract #53-43ZP-8-00008. Atlanta: United States Forest Service, Regional Office.

_____. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.

_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

_____. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Photograph:

19. Longleaf Flatwoods, Site for Chaffseed, Highway 41 Community Complex

Quadrangle: Cedar Creek, S.C.

Site 18: Lake Guilliard Natural Area
Associated Waterways: Santee River and Lake Guilliard
Ownership: United States Forest Service

Description:

Lake Guilliard Natural Area harbors an alluvial floodplain and a former creek-bed that once fed into the Santee River. The upper portion is now Lake Guilliard. Growing on the floodplain is a bottomland bald cypress-tupelo gum swamp forest. This is a mature forest with large trees, many of which are probably original growth trees. Hurricane Hugo felled many of the trees and broke branches of others. Natural levees occur along the river edge and traverse the swamp. The levees support less water-tolerant species.

The hydrology of the site has probably been altered due to shifts in the river's position and from diversion of the Santee River in 1940. What effects the Rediversion Project will have is not known.

This site is suited for field trips to study a bottomland, bald cypress-tupelo gum swamp.

Significance:

Floodplain along brown-water river with bald cypress-tupelo gum swamp.

References:

Porcher, Richard D. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.
Stubbs, Jack. 1963. Establishment Report for Guilliard Lake Natural Area within the Francis Marion National Forest, Berkeley County, South Carolina. Atlanta: United States Forest Service.

Photograph:

20. Bald Cypress-Tupelo Gum Bottomland Forest, Lake Guilliard Natural Area

Site 19: Echaw Creek
Associated Waterway: Santee River
Ownership: Private and United States Forest Service

Description:

Echaw Creek is a pristine, tidal blackwater creek. It traverses an alluvial bald cypress-tupelo gum bottomland swamp forest which was timbered long ago; today the secondary forest is mature. A few large trees occur along the edge of the creek. A rich growth of herbs, vines and shrubs occurs in the swamp and along the creek edge. The forest on the west side is part of the Francis Marion National Forest; lands on the east side are privately owned.

Echaw Creek is often used by nature groups for canoe trips.

The creek begins in the area covered by the Honey Hill, S.C., Quadrangle; most of the creek is in the Cedar Creek Quadrangle.

Significance:

Scenic creek and wetland habitat.

References:

Porcher, Richard D. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.
_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Photograph:

21. Echaw Creek

Quadrangle: Cordesville, S.C.

Site 20: Cordesville Schwalbea Population

Associated Waterway: Mepkin Creek

Ownership: United States Forest Service

Description:

This population of Schwalbea was discovered by the author during the 1980 survey of the FMNF. Most of the plants occur along the roadbank where mowing has kept the land open. Some plants grow in the powerline that flanks Highway 402. Over the years the population has vacillated. In 1983 only five plants were found; in 1994 approximately 30 plants were present. The site is typical for chaffseed: sandy, longleaf pine flatwoods. The population will be monitored yearly by scientists as part of an ongoing study of rare plants in the FMNF.

Significance:

Site for American chaffseed, a Federally Endangered Species.

Voucher:

Schwalbea americana L.; Richard D. Porcher #1540; 14 June, 1979; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Porcher, Richard D. 1980. Inventory of Populations of Proposed Endangered and Threatened Species of Vascular Plants on the Francis Marion National Forest in Berkeley and Charleston Counties. Final Report for Contract #53-43ZP-8-00008. Atlanta: United States Forest Service, Regional Office.

_____. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Site 21: Wadboo Creek Marl Forest

Associated Waterways: Wadboo Creek; Western Branch of the Cooper River

Ownership: Santee Cooper Public Service Authority

Description:

The marl forest community is very rare in the state (Nelson, 1986; Porcher, in press). The marl forest on Wadboo Creek is probably the best developed and most intact in the state (Porcher, field notes). Numerous rare species are found in this site including one candidate for federally endangered status: incised groovebur (*Agrimonia incisa*). Other rare species include alum root (*Heuchera americana*), crested coral-root (*Hexalectris spicata*), buckthorn (*Rhamnus caroliniana*), yellow chestnut oak (*Quercus muehlenbergii*), blackstem spleenwort (*Asplenium resiliens*) and liverleaf (*Hepatica americana*).

The forest occurs on a marl bluff along Wadboo Creek. Much marl is exposed as outcrops. It is on the outcrops that both spleenwort (photograph 23) and alum root occur. The adjoining property is private; public access is by boat from Wadboo Creek and the Dennis Boat Landing on S.C. 402.

The site is also of historical importance. Evidence of marl quarries still exist where marl was obtained to build The Rectory Plantation house.

Significance:

Rare marl forest community; rare plants; endangered species candidate.

Voucher:

Agrimonia incisa T. & G.; Richard D. Porcher #183a; 8 August, 1971; The Citadel Herbarium.

References:

Federal Register. Plant Taxa for Listing as Endangered or Threatened Species: Notice of Review. Vol. 58, No. 188. September 30, 1993.

Nelson, John B. 1986. The Natural Communities of South Carolina. Columbia: South Carolina Wildlife and Marine Resources Department.

Porcher, Richard D. In Press. Wildflowers of the Carolina Lowcountry. Columbia: University of South Carolina Press.

Photographs:

22. Wadboo Creek Marl Forest

23. Blackstem spleenwort (*Asplenium resiliens*), Wadboo Creek Marl Forest

Site 22: Watson's Schwalbea Site

Associated Waterway: Alligator Creek

Ownership: United States Forest Service

Note:

Part of this site occurs in the Bethera Quadrangle.

Description:

This site harbors the largest concentration of American chaffseed (*Schwalbea americana*), a Federally Endangered Species, on the FMNF. It supports an open stand of longleaf pine flatwoods, the typical community for chaffseed. The open nature of the site is maintained by regular prescribed burning by the Forest Service.

Significance:

Site for American chaffseed, a Federally Endangered Species.

Voucher:

Schwalbea americana L.; Richard D. Porcher #2318; 25 June, 1993; The Citadel Herbarium.

References:

- Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.
- Porcher, Richard D . 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.
- _____. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Photograph:

24. Longleaf Pine Flatwoods, Site for Chaffseed, Watson's *Schwalbea* Site

Quadrangle: Honey Hill, S.C.

Site 23: Echaw Road *Lindera*
Associated Waterway: Red Bluff Creek
Ownership: United States Forest Service
Description:

This site is a pond cypress swamp forest/pond in a lime sink. A population of *Lindera melissifolia* occurs along its margin. Two rare species of the sedge family, *Rhynchospora inundata* (Oakes) Fernald and *Psilocarya scirpoides* Torrey, were reported in the sink by Porcher (1982). The open pond is habitat for waterfowl. It is a site of unusual natural beauty; Tom Blagden featured it in his book *Lowcountry: The Natural Landscape* (pages 30-31). The pond is spring-fed and the water is crystal-clear.

Significance:

Wetland site with a Federally Endangered Species, rare plants and unique natural beauty.

Voucher:

Lindera melissifolia (Walter) Blume; Richard D. Porcher #1624; 16 May, 1980; The Citadel Herbarium.

References:

- Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.
- Blagden, Tom, Jane Lareau and Richard Porcher. 1988. *Lowcountry: The Natural Landscape*. Greensboro: Legacy Publications.
- Porcher, Richard D. 1980. Inventory of Populations of Proposed Endangered and Threatened Species of Vascular Plants on the Francis Marion National Forest in Berkeley and Charleston Counties. Final Report for Contract #53-43ZP-8-00008. Atlanta: United States Forest Service, Regional Office.
- _____. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.

_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Photograph:

25. Lime Sink with Pond Cypress Swamp Forest/Pond, Echaw Road Linder

Site 24: Honey Hill Sink Holes Complex

Associated Waterway: Echaw Creek, Wambaw Creek and Santee River

Ownership: United States Forest Service

Description:

Two lime sink systems form this site for pondberry (*Lindera melissifolia*), a Federally Endangered Species. The sinks harbor the largest concentration of pondberry in the state. Sixty+ populations of pondberry were identified (Rayner and Ferral, 1988). Both sink systems harbor a pond cypress isolated, upland swamp forest. Numerous other species of rare plants occur in the vicinity of the sinks. The sinks also serve as waterfowl nesting and feeding sites.

The Forest Service, in conjunction with the Nature Conservancy of South Carolina, is developing plans to have the area classified as a Research Natural Area. This would exclude timbering in the area.

Significance:

Site for pondberry, a Federally Endangered Species, and wildlife area.

Vouchers:

a. *Lindera melissifolia* (Walter) Blume; Richard D. Porcher #1527; 22 March, 1979; The Citadel Herbarium.

b. *Lindera melissifolia* (Walter) Blume; Richard D. Porcher #1526; 22 March, 1979; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Porcher, Richard D. 1980. Inventory of Populations of Proposed Endangered and Threatened Species of Vascular Plants on the Francis Marion National Forest in Berkeley and Charleston Counties. Final Report for Contract #53-43ZP-8-00008. Atlanta: United States Forest Service, Regional Office.

_____. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.

_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Rayner, Douglas A. and D. P. Ferral. 1988. Honey Hill Limesinks. Final Report. Columbia: S.C. Heritage Trust Program.

Photograph:

26. Lime Sink with Pond Cypress Swamp Forest/Pond, Honey Hill Sink Holes Complex

Site 25: Blue Springs

Associated Waterway: Echaw Creek

Ownership: United States Forest Service

Description:

Blue Springs consist of two artesian springs that flow into Echaw Creek. The first spring flows into the second; the waters of both then flow into the creek. The water is crystal clear, typical of artesian springs. Active artesian springs were once common in the coastal area; however, most are now covered by the waters Lake Moultrie and Lake Marion. Drastic changes in the hydrology of the coastal area have caused most remaining springs to have greatly reduced water-flow. Blue Springs still has a significant discharge and is the best know example of this geological formation in the coastal area.

One unusual plant in the springs is *Nuphar luteum* ssp. *marcophyllum*; its submerged leaves are greatly enlarged (Beal, 1977).

Significance:

Artesian spring, a rare geological formation.

Reference:

Beal, E. O. 1977. A Manual of Marsh and Aquatic Vascular Plants of North Carolina.

North Carolina Agricultural Experiment Station. Raleigh: N. C. State University.

Porcher, R. D. 1982. Inventory of Natural Areas in the Francis Marion National Forest.

Final Report. Atlanta: United States Forest Service, Regional Office.

_____.1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Photograph:

27. Blue Springs

Site 26: Wambaw Creek Carolina Bay

Associated Waterway: Wambaw Swamp

Ownership: United States Forest Service

Description:

Wambaw Creek Carolina Bay represents a well-delineated asymmetrically-shaped Carolina bay. I conducted a floristic study (Porcher, 1966) in 1966 and identified two major communities: a pond cypress savanna and a pond cypress-swamp gum swamp forest. In 1982 and 1991 I visited the bay and reported that pond cypress has become established in much of the savanna habitat in the north portion of the bay. This does not diminish its natural beauty or ecological significance.

Significance:

Carolina bay with pond cypress savanna and pond cypress-swamp gum swamp forest communities, both significant wetland habitats.

References:

Porcher, Richard D. 1966. A Floristic Study of the Vascular Plants in Nine Selected Carolina Bays in Berkeley County, S.C. Master's Thesis, University of South Carolina.

_____. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.

_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Savage, Henry. 1982. The Mysterious Carolina Bays. Columbia: University of South Carolina Press.

Photograph:

28. Pond Cypress Savanna, Wambaw Creek Carolina Bay

Site 27: Hillside Herb Bog

Associated Waterways: Big Morgan Branch and Wambaw Creek

Ownership: United States Forest Service

Description:

Hillside herb bogs (or seepage herb bogs) are not well documented in the coastal area. Nelson (1986) states they possibly occur in the entire Coastal Plain. Porcher (in press) describes this microhabitat as follows:

“Where the adjacent pine flatwoods slope toward the pocosins (or a swamp forest), a permanent, wet zone develops. Rainwater that percolates into the sandy flatwoods soil hits a confining layer that forces the water to move laterally until it emerges as seepage at the base of the slope. The soil is permanently saturated (except in extreme droughts) and very springy. A rich variety of bog species occur in the seepage bogs, many the same ones that occur in the longleaf pine savannas. Seepage bogs can be distinguished from the pine savannas by the presence of the pitcher-plants. Hooded pitcher-plant (*Sarracenia minor*) is the dominant species in the pine savannas, but is absent or rare in the seepage bogs. In seepage bogs, sweet pitcher-plant (*S. rubra*) and yellow trumpet (*S. flava*) are the dominant species. Sweet pitcher-plant does occur in the savannas, but grows poorly. When growing in seepage bogs, however, it is robust. Fire is also important in maintaining this microhabitat; lack of fire allows adjacent pocosin shrubs to dominate the site.”

No adequate survey of this community has been conducted in the coastal area. The bog described in this report is very rich in herbs, including numerous orchids and carnivorous plants. Sweet pitcher-plant is especially abundant and robust.

Significance:

Rare and poorly documented plant community in the coastal area.

References:

Nelson, John B. 1986. The Natural Communities of South Carolina. Columbia: South Carolina Wildlife and Marine Resources Department.

Porcher, Richard. D. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.

_____. In Press. Wildflowers of the Carolina Lowcountry. Columbia: University of South Carolina Press.

Photograph:

29. Hillside Herb Bog

Quadrangle: Huger, S.C.

Site 28: Leneigh, Hard Pinch and Red Bank Reserves
Associated Waterway: East Branch of the Cooper River
Ownership: Private; Varen Coen, 64 Meeting Street, Charleston, S.C.

Description:

These reserves were used during the rice-growing period to furnish supplementary water to rice fields along the Cooper River. Supplementary water was necessary during times of drought which allowed salt water to move up the river. Today the water levels in Leneigh and Hard Pinch are regulated for waterfowl. Both are planted then flooded during the hunting season. The water level in Red Bank is maintained constant and it supports a variety of freshwater aquatic species.

Significance:

Former inland reserves for rice fields along the Cooper River and significant wetland systems and waterfowl habitat today.

References:

- Carney, Judith, and Richard D. Porcher. 1993. Geographies of the Past: Rice, Slaves and Technological Transfer in South Carolina. *Southeastern Geographer* Vol. XXXIII (2): 127-147.
- Heyward, Duncan C. 1937. Seed from Madagascar. Chapel Hill: The University of North Carolina Press.
- The Jaeger Company. 1993-94. Associated documents on the inventory of Tea Farm. Gainesville, GA.
- Porcher, Richard D. 1985. A Field Guide to The Bluff Plantation. New Orleans: The Kathleen O'Brien Foundation.
- _____. 1987. Rice Culture in South Carolina: A Brief History, The Role of the Huguenots, and Preservation of its Legacy. *Transactions of the Huguenot Society* 92:1-22.

Photographs:

30. Aerial View of Leneigh, Hard Pinch and Red Bank Reserves
31. Aerial View of Hard Pinch Reserve

Site 29: Huger and Quenby Creeks
Associated Waterway: East Branch of the Cooper River
Ownership: Abandoned rice fields on either side under various private owners
Description:

The tidal freshwater swamps flanking both creeks were converted into fields in the 1700-1800's to grow rice. Numerous historic plantations were established along these creeks (Limerick, Bossis) as rice became a dominant export crop of the state. The fields were abandoned in the late 1800's and early 1900's as rice growing ceased. Today the fields and creek edges harbor tidal freshwater marshes that provide habitat for a variety of wildlife, including the bald eagle and osprey. The tidal freshwater marshes are also one of the most diverse wildflower gardens; over a 100 species of plants have been identified in this community along these creeks. Organic matter washed from the fields forms the basis of the food chain for the Cooper River and Charleston Harbor.

Significance:

Outstanding wetland natural area.

Photographs:

32. Aerial View of Huger Creek and Tidal Freshwater Marsh in Former Rice Fields

33. Quenby Creek and Associated Former Rice Fields

Site 30: Quenby Bridge Road Schwalbea

Associated Waterway: Quenby Creek

Ownership: Undetermined

Description:

This site harbors a small population of American chaffseed, a Federally Endangered Species. Approximately forty plants occur under the powerline that runs parallel to the county road (SC-598, Quenby Bridge Road). The population was found in 1994. The open conditions necessary for chaffseed are maintained by mowing.

Significance:

Site for American chaffseed (*Schwalbea americana*), a Federally Endangered Species.

Voucher:

Schwalbea americana L.; Richard D. Porcher #2351; 22 June, 1994; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Porcher, Richard D. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Photograph:

34. Site for Chaffseed under Powerline, Quenby Bridge Road Schwalbea

Site 31: Middleburg Rice Mill

Associated Waterway: Eastern Branch of the Cooper River

Ownership: Private: Max Hill

Description:

The abandoned rice mill at Middleburg Plantation represents the most complete remains of an 1800's water powered and steam powered rice mill. The brick chimney still stands, remains

of the brick viaduct from the boiler to the chimney can still be discerned, the double-boilers are still retained, in part, in their brick casing, and the steam engine is intact. The building that housed the milling machinery is gone; however, by a fortuitous set of events, photographs of the inside of the mill are available. The photographs clearly show the system of mortars and pestles used to clean the rice. From the artifacts of the Middleburg Mill, the workings of a rice mill can be reconstructed in great detail.

The mill was originally a water-powered mill and was the first toll-mill for rice (Irving, 1932). The sluice-way with the water-wheel mounts are still evident. The nearby rice field functioned as the mill pond.

The steam engine is especially significant. Only four steam engines built in Lowcountry foundries still remain in the Lowcountry: the Middleburg engine, one at Mansfield Plantation in Georgetown County, one at the Blessing Plantation in Berkeley County, and the one on display at the Charleston Museum (Porcher, 1987).

Significance:

Remains of the first toll-mill for rice.

References:

Irving, John B. 1932. *A Day on Cooper River*. Columbia: The R. L. Bryan Company.
Porcher, Richard D. 1987. *Rice Culture in South Carolina: A Brief History, The Role of the Huguenots, and Preservation of its Legacy*. Transactions of the Huguenot Society 92:1-22.

Photographs:

- 35. Rice Mill Chimney, Middleburg Plantation
- 36. Remains of Steam Engine, Middleburg Plantation

Site 32: Koppers Company Schwalbea

Associated Waterway: French Quarter Creek

Ownership: Private; Congaree-Carton, Limited Partnership, Sumter, S.C.

Description:

This site harbors a population of American chaffseed (*Schwalbea americana*), a Federally Endangered Species. The site is a sandy, longleaf pine flatwoods adjacent to S.C. 99; Hurricane Hugo removed most of the mature pines in 1989. The downed timber was salvaged and the site replanted in pine. The population has been declining in numbers; no plants were found in 1992 and five plants were found in 1993. The plants occur on the roadside bank.

Note:

The site was owned by the Koppers Tree Company when chaffseed was first reported at the site by the author; it is now owned by Congaree-Carton.

Significance:

Site for American chaffseed, a Federally Endangered Species.

Voucher:

Schwalbea americana L.; Richard D. Porcher #456; 27 May, 1972; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Porcher, Richard D. 1980. Inventory of Populations of Proposed Endangered and Threatened Species of Vascular Plants on the Francis Marion National Forest in Berkeley and Charleston Counties. Final Report for Contract #53-43ZP-8-00008. Atlanta: United States Forest Service, Regional Office.

_____. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Photograph:

37. Site for Chaffseed along Roadside, Koppers Company *Schwalbea*

Site 33: Blessing Plantation Rice Mill
Associated Waterway: Eastern Branch of the Cooper River
Ownership: Private

Description:

On the edge of a small canal (manmade?) leading from the Eastern Branch of the Cooper River on what was originally the Blessing Plantation is an old rice mill. The chimney still stands, but is in poor condition and deteriorating rapidly. Unless it is stabilized, it will not stand much longer. Nothing remains of the mill house. One of the earlier Charleston-made steam engines is present, lying on its side, no longer on its engine mount. This engine is significant because it is one of only four locally-built steam engines from the rice industry still present in the Lowcountry (Porcher, 1987). In the nearby canal are the remains of barge that I believe was used in the rice nearby rice fields. Professional archaeologists have not investigated the barge to determine its date or value.

Significance:

Abandoned rice mill with valuable artifacts.

Reference:

Porcher, Richard D. 1987. Rice Culture in South Carolina: A Brief History, The Role of the Huguenots, and Preservation of its Legacy. Transactions of the Huguenot Society 92:1-22.

Photographs:

38. Rice Chimney at Blessing Plantation
39. Steam Engine at Blessing Plantation

Site 34: Quenby Plantation Longleaf Pine Savanna
Associated Waterway: Quenby Creek
Ownership: Private; Knoth Family of Charleston

Description:

This site is a longleaf pine savanna with numerous significant and rare plants. Most of the mature pines were felled during Hurricane Hugo and it has been replanted in loblolly pine.

Accordingly, the site is more historically significant. There are small sections of savanna not planted in pine that still harbor savanna species. The site also is subject to wildfire, being so near a rural settlement, that the savanna character may be restored.

Rare herbs include *Bartonia verna*, *Habenaria integra* (yellow fringeless orchid) and *Calopogon barbatus* (bearded grass-pink). Species of note include hooded pitcher-plant, pine lily, grass-pink and pale grass-pink. A complete floristic list of the site is not available; I am of the opinion additional significant species will be found.

Significance:

Longleaf pine savanna and rare plants.

Photograph:

40. Longleaf Savanna Community in February, 1995, Quenby Plantation

Quadrangle: Jamestown, S.C.

Site 35: Limestone Bluff at Old Jamestown

Associated Waterway: Santee River

Ownership: Huguenot Society of South Carolina

Description:

The original site of the first French Huguenot settlement in South Carolina was a high limestone bluff along the Santee River northeast of the present town of Jamestown. The limestone formation is exposed along the river's edge. A population of Carolina spleenwort (*Asplenium heteroresiliens*) occurs in the crevices of the limestone. Carolina spleenwort is very rare and known from only two sites in South Carolina. It is presently listed as a Category 2 species by U. S. Fish and Wildlife Service (Federal Register, September 1993).

Although the site is owned by the Huguenot Society, ingress to the site is through private land of the Pipkin family of Jamestown.

Significance:

Limestone community with Carolina spleenwort, a Category 2 species.

Voucher:

Asplenium heteroresiliens Wagner; Richard D. Porcher #1549b; 18 July, 1979; The Citadel Herbarium.

References:

Federal Register. Plant Taxa for Listing as Endangered or Threatened Species: Notice of Review. Vol. 58, No. 188. September 30, 1993.

Heron, S. D., Jr. 1962. Limestone Resources of the Coastal Plain of South Carolina.

Bulletin #28. Columbia: Division of Geology, State Development Board.

Porcher, Richard D. 1980. Inventory of Populations of Proposed Endangered and Threatened Species of Vascular Plants on the Francis Marion National Forest in Berkeley and Charleston Counties. Final Report for Contract #53-43ZP-8-00008. Atlanta: United States Forest Service, Regional Office.

Photograph:

41. Carolina Spleenwort on Limestone Bluff at Old Jamestown

Site 36: Dutart Creek Limestone Outcrop
Associated Waterways: Santee River and Dutart Creek
Ownership: United States Forest Service
Description:

This site has a large outcrop of Santee limestone along side an old creek bed (Dutart Creek). The outcrop supports a population of Carolina spleenwort (*Asplenium heteroresiliens*), a Category 2 species. Limestone outcrops and Carolina spleenwort are rare entities in South Carolina.

Hurricane Hugo removed most of the canopy from the site: however, Porcher (1993) reported that in 1992 approximately 25 specimens of the fern were growing on the main outcrop. Two smaller outcrops had three and four specimens respectively.

Significance:

Carolina spleenwort, a Category 2 species, and limestone outcrop.

Voucher:

Asplenium heteroresiliens Wagner; Richard D. Porcher #1596a; 9 September, 1979;
The Citadel Herbarium.

References:

Federal Register. Plant Taxa for Listing as Endangered or Threatened Species: Notice of Review. Vol. 58, No. 188. September 30, 1993.

Heron, S. D., Jr. 1962. Limestone Resources of the Coastal Plain of South Carolina. Bulletin #28. Columbia: division of Geology, State Development Board.

Porcher, Richard D. 1980. Inventory of Populations of Proposed Endangered and Threatened Species of Vascular Plants on the Francis Marion National Forest in Berkeley and Charleston Counties. Final Report for Contract #53-43ZP-8-00008. Atlanta: United States Forest Service, Regional Office.

_____. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.

_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

_____. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Photograph:

42. Limestone Outcrop along Dutart Creek, Site for Carolina Spleenwort

Quadrangle: Kittredge, S.C.

Site 37: Medway Plantation
Associated Waterways: Back River and Prioleau Creek
Ownership: Mrs. Sidney J. Lagendre and the Medway Environmental Trust
Description:

Medway Plantation is a nationally recognized site. It has been featured in numerous books, including Stoney's Plantations of the Carolina Low Country (1938). The owner, Mrs.

Lagendre, gives a vivid account of the history and times at Medway in her autobiography *The Time of My Life*.

A process is being undertaken at the present to have the 6000-acre plantation as a foundation to preserve its natural state and to provide access to the public for educational trips and scientific research. Details of the foundation have not been made public.

The natural beauty of Medway is exceptional. Former rice fields line the Back River, supporting tidal freshwater marshes of exceptional beauty; inland impoundments provide outstanding habitat for waterfowl; upland pine forests support the endangered red-cockaded woodpecker; hardwood forests support turkey and deer; and swamp forests provide valuable habitat for waterfowl. Excellent roads provide access to the entire plantation and a system of fire breaks is maintained for controlled burning. Wildlife management practices have been done on Medway for years and have attributed much to enhance wildlife populations.

The pine forests on Medway were devastated by Hurricane Hugo and a valuable source of money to support the foundation was lost.

I am not aware of any detailed surveys of the flora and fauna of Medway; I understand they will be undertaken in the future.

Significance:

Nationally recognized historic plantation and outstanding 6000-acre natural area.

References:

Lagendre, Gertrude S. 1987 . *The Time of My Life*. Charleston: Wyrick & Company.

Stoney, Sameul G. 1938. *Plantations of the Carolina Low Country*. Charleston: Carolina Art Association.

Site 38: The Bluff Plantation Wildlife Sanctuary

Associated Waterways: Western Branch of the Cooper River; Durham Canal; Back River

Ownership: Private; The Kathleen O'Brien Foundation

Description:

The Bluff Plantation is a 2000-acre wildlife sanctuary on the Western Branch of the Cooper River. It is owned by the Kathleen O'Brien Foundation of New Orleans and is operated as a wildlife sanctuary and educational facility opened to the public by appointment. The forested communities were severely damaged by Hurricane Hugo in 1989; still, the site supports a variety of intact, natural communities supporting a wide variety of wildlife. Communities include freshwater tidal marshes, longleaf pine flatwoods, tupelo gum-bald cypress swamp forests and upland oak-hickory forests. One bald eagle nest is on the Sanctuary. The swamp forest and tidal rice fields are important feeding sites and rookeries for waterfowl.

A intact inland rice field occurs on the Sanctuary. Porcher (1985) mapped the field (Appendix Map 3) and discovered the remains of several trunks. One could be of significant historical importance: a single-gate trunk at the head of the inland field. Examples of the double-gate trunks used in the tidal rice system are common in the Lowcountry; however, only one single-gate is known, the one at The Bluff. Whether it is an earlier step in the evolution of the double-gate trunk is not known.

Significance:

Wildlife sanctuary; bald eagle nest; inland rice field with single-gate trunk; educational facility.

References:

Porcher, Richard D. 1985. A Field Guide to The Bluff Plantation. New Orleans: The Kathleen O'Brien Foundation.

_____. 1987. Rice Culture in South Carolina: A Brief History, The Role of the Huguenots, and Preservation of its Legacy. Transactions of the Huguenot Society 92:1-22.

Photographs:

43. Aerial View of Tidal Rice Fields, The Bluff Plantation Wildlife Sanctuary

44. Reserve Swamp, The Bluff Plantation Wildlife Sanctuary

Site 39: Comingtee Rice Mill

Associated Waterway: Western Branch of the Cooper River

Ownership: Westvaco Corporation

Description:

Only two rice mills made of brick still stand in the Lowcountry: one at Middleton Plantation in Dorchester County and one at Comingtee Plantation. The wooden structures of the mill are no longer present; only the brick walls stand. The mill was originally a water-powered mill. The sluice-way is intact with the mount for the waterwheel. The mill was later converted to a steam-driven mill; the engine mount is inside the brick walls.

Comingtee Rice Mill is on property owned by Westvaco Corporation. Comingtee Plantation is one of several plantations acquired by Westvaco on the Cooper River and managed under one entry, Bonneau Ferry Plantation. Westvaco has taken steps to preserve the mill site.

Significance:

One of two brick mills used for processing rice left in the Lowcountry.

Photographs:

45. Remains of Comingtee Rice Mill

46. Sluice-way, Comingtee Rice Mill

Quadrangle: Mount Holly, S. C.

Site 40: I-26 Savanna

Associated Waterway: Stroberfield Branch

Ownership: Private

Description:

I-26 Savanna is approximately 5 acres in size; I discovered this savanna in the 1970's. During the 70's and early 80's, it was periodically burned and kept in an open condition typical of savannas. Absence of significant fire the last decade has allowed a dense layer of shrubs and trees to develop and the savanna aspect is lacking. I tried to have the site purchased by The South Carolina Nature Conservancy; however, the asking price was prohibitive since the site lies along an area of I-26 that is heavily developed.

A rich variety of savanna species occurs in the site: pitcher-plants, sundews, orchids, etc. Three rare orchids occur: *Eulophia ecristata* (Fernald) Ames, spiked medusa, a Category 2 species; *Habenaria lacera* (Michaux) Lodd., green fringed orchid; and *Habenaria integra* (Nuttall) Spreng., yellow fringeless orchid. A complete floristic survey of the site was never conducted; it is my opinion that additional rare savanna species may occur.

Spiked medusa was collected from the edge of the savanna in the adjacent flatwoods. I do not recall observing the plant again after the initial observation.

Lack of recent fire has caused a dense shrub and tree growth to develop. Fire at this time would restore the savanna community without loss of significant species; however, the future integrity of the site would be jeopardized by long-term absence of fire.

Significance:

Longleaf pine savanna, *Eulophia ecristata*, a Category 2 species, and numerous rare species.

Vouchers:

Habenaria integra (Nuttall) Spreng.; Richard D. Porcher #724 and 724a; 25 August, 1973; The Citadel Herbarium.

Habenaria lacera (Michaux) Lodd.; Richard D. Porcher #1238a-c; 19 May, 1977; The Citadel Herbarium.

Reference:

Federal Register. Plant Taxa for Listing as Endangered or Threatened Species: Notice of Review. Vol. 58, No. 188. September 30, 1993.

Photographs:

47. I-26 Savanna in 1984

48. I-26 Savanna in February 1995

Quadrangle: Ocean Bay, S.C.

Site 41: Swamp Gum Swamp Forest with *Lindera*

Associated Waterways: Echaw Creek and Wambaw Swamp

Ownership: United States Forest Service

Description:

This site is a swamp gum (*Nyssa biflora*), isolated swamp forest within longleaf pine flatwoods. Swamp gum is the dominant tree with a few scattered pond cypress. Much of the interior is open; shrubs are confined to the bases of trees and knees. The edge is a dense pocosin community.

A robust population of pondberry (*Lindera melissifolia*), a Federally Endangered Species, occurs in openings along the west side of the wetland. *Litsea aestivalis*, another rare shrub, occurs in the interior

Significance:

Wetland habitat and site for endangered species.

Voucher:

Lindera melissifolia (Walter) Blume; Richard D. Porcher #1625a; 16 May, 1980; The Citadel Herbarium.

References:

- Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.
- Porcher, Richard D. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.
- _____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.
- _____. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Photograph:

49. Swamp Gum Swamp Forest with *Lindera*

Site 42: Harleston Dam Road Pond Cypress/*Carex* Community

Associated Waterway: Harleston Dam Creek

Ownership: United States Forest Service

Description:

This is the largest undisturbed pond cypress/*Carex walteriana* savanna in the Francis Marion National Forest and probably one of the largest in the coastal area. It is around ten acres in size. The community itself is not common. Pond cypress (*Taxodium ascendens*) occurs in an almost pure stand and the trees are of good size. *Carex walteriana* forms a pure ground cover. The site is flooded in rainy times. This community is removed from roads and is an excellent natural area.

This community is not recognized by Nelson (1986) or Barry (1980); Porcher and Everett (1994) included its description in a recent study of the Francis Marion National Forest. The almost complete dominance by *Carex walteriana* does not allow it to be classified as a pond cypress savanna which contains many showy wildflowers. Porcher and Everett settled on the classification of pond cypress-*Carex walteriana* savanna to distinguish it from a pond cypress savanna.

Significance:

Large, undisturbed pond cypress/*Carex walteriana* savanna.

References:

- Barry, John M. 1980. Natural Vegetation of South Carolina. Columbia: University of South Carolina Press.
- Nelson, John B. 1986. The Natural Communities of South Carolina. Columbia: South Carolina Wildlife and Marine Resources Department.
- Porcher, Richard D. and Jean Everett. 1994. Mapping of Plant Communities on 4000-Acre Tract of Land in the Francis Marion National Forest. Final Report submitted to Columbia Office, United States Forest Service.

Photograph:

50. Harleston Dam Road Pond Cypress/*Carex* Community

Quadrangle: Schulerville, S.C.

Site 43: Hellhole Bay Wilderness Area
Associated Waterway: Echaw Creek
Ownership: United States Forest Service

Description:

Hellhole Bay has long been a part of the folk history of Berkeley County. In colonial times and up to the early 1900's it was regularly burned to create "savanna land" for cattle grazing. During Prohibition it harbored many stills to produce "bootleg" spirits, and numerous politicians from Berkeley County proudly claim they were raised in Hellhole Swamp.

In 1980, 2200 acres of Hellhole Bay were designated a Wilderness Area. Hellhole Bay is a shallow basin that acts as a collecting basin for rainwater from the surrounding pine uplands. A non-alluvial upland swamp dominates the bay, with pond cypress, pond pine, swamp gum and red maple the dominant trees.

In past times Hellhole Bay was more open and dominated by a savanna community of grasses and sedges with patches of fire-resistant shrubs. The savanna community was maintained by frequent fire set by local citizens to provide grazing habitat. Fire suppression by the Forest Service has allowed the present swamp community to dominate the site. Periodic wild-fires maintain smaller patches of savanna.

Hellhole Bay is used for canoeing during the wet season. Past fire-breaks provide access to the interior of the swamp by canoe or foot.

Significance:

Major wetland system.

Photographs:

- 51. Aerial of the Big Opening in 1980, Hellhole Bay Wilderness Area
- 52. Savanna Community, Big Opening, Hellhole Bay Wilderness Area

Quadrangle: Summerville, S.C.

Site 44: Wassamassaw Swamp Natural Area
Associated Waterways: Wassamassaw Swamp and Great Cypress Swamp
Ownership: Westvaco Corporation

Description:

The Wassamaasaw Natural Area is a 10-acre site of bottomland bald cypress and tupelo gum swamp forest. It includes a two-acre island surrounded by shallow "runs" or streams having typical swamp characteristics. The Society of American Foresters (SAF) considers this site a Natural Area because of the undisturbed and pristine nature of the swamp. SAF defines a natural area as a site that exemplifies typical or unique vegetation influenced by soil and geological activity. Although select harvesting occurred about 30 years ago, the disturbance was not significant.

The site is actually located in the Great Cypress Swamp; Westvaco officials are uncertain why it was named for the Wassamassaw Swamp which drains into the Great Cypress Swamp.

Significance:

Excellent example of a bottomland bald cypress-tupelo gum swamp forest.

Photograph:

53. Bald Cypress-Tupelo Gum Swamp Forest, Wassamassaw Swamp Natural Area

CHARLESTON COUNTY

Quadrangle: Awendaw, S.C.

Site 45: Little Wambaw Swamp Wilderness Area

Associated Waterways: Steed Creek and Little Wambaw Swamp

Ownership: United States Forest Service

Description:

Little Wambaw Swamp Wilderness Area consists of 5223 acres and was established as a Wilderness Area in 1980. It is listed in the Directory of Society of American Foresters Natural Areas because it exemplifies typical or unique vegetation influenced by soil and geological activity. Little Wambaw Swamp is an example of the generalized forest type described as a "creek swamp" by some sources. In Nelson's (1986) classification it probably fits the non-alluvial swamp forest. As a headwater for several creeks (Steed Creek and Little Wambaw Swamp), it is not subject to flooding by inundation as are river bottomlands. It serves as a collecting basin for rainwater from surrounding pine uplands and there are no well-defined waterways. Flood waters rarely exceed 16 inches and the water moves toward various outlets before becoming creeks.

Before Hurricane Hugo, the forest cover was a relatively uniform stand dominated by swamp tupelo mixed with bald cypress and scattered tupelo gum. A considerable number of mature trees were felled during the hurricane. I have no knowledge of anyone conducting a survey of the swamp since the hurricane because of the impenetrable nature of the vegetation today. It still functions, however, as a major wetland habitat and will, in time, recover from the damage from the hurricane.

Significance:

Major swamp system.

References:

Mohlenbrock, R. H. 1977. Forest of the Swamp Fox. American Forest.

Nelson, John B. 1986. The Natural Communities of South Carolina. Columbia: South Carolina Wildlife and Marine Resources Department.

Site 46: Awendaw Savanna

Associated Waterway: Awendaw Creek
Ownership: United States Forest Service
Description:

Awendaw Savanna harbors a population of American Chaffseed (*Schwalbea americana*), a Federally Endangered Species. The plants occur in the longleaf pine flatwoods and in an abandoned field adjacent to the flatwoods. The site was used by the author to study the effects of fire on chaffseed. The study was funded by the United States Fish and Wildlife Service (Porcher, 1994).

The site also harbors two rare orchids: *Spiranthes laciniata* (lace-lip spiral orchid) and *Habenaria integra* (yellow fringeless-orchid). The orchids occur in the adjacent savanna.

Significance:

Site for Federally Endangered Species and rare orchids.

Voucher:

Schwalbea americana L.; Richard D. Porcher #2354; 15 July, 1994; The Citadel Herbarium.

References:

- Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.
- Porcher, Richard D. 1980. Inventory of Populations of Proposed Endangered and Threatened Species of Vascular Plants on the Francis Marion National Forest in Berkeley and Charleston Counties. Final Report for Contract #53-43ZP-8-00008. Atlanta: United States Forest Service, Regional Office.
- _____. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.
- _____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.
- _____. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.
- _____. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Quadrangle: Bull Island, S.C.

Site 47: Sewee Indian Shell Midden
Associated Waterway: Intracoastal Waterway
Ownership: United States Forest Service
Description:

Sewee Midden is one of the approximately 30 middens of Indian origin along the Carolina coast. It lies adjacent to a small salt creek of the Intracoastal Waterway. The midden is a significant archeological site and is protected by the Antiquities Act. Shell middens, however, often harbor a rare assemblage of plants that are termed calciphytes. Several rare plants occur on

the Sewee Midden: shell-mound buckthorn (*Sageretia minutiflora*), buckthorn (*Rhamnus caroliniana*), white basswood (*Tilia heterophylla*) and crested coral-root (*Hexalectris spicata*).

Hurricane Hugo severely damaged the trees of the midden; however, the community is intact and will take years for the trees to reach full size again.

Significance:

Indian Midden with marl forest.

References:

Barry, John M. 1980. *The Natural Vegetation of South Carolina*. Columbia: University of South Carolina Press.

Dorroh, Rita J. 1971. *The Vegetation of Indian Shell Mounds and Rings of the S. C. Coast*. Columbia: Unpublished Master's Thesis, University of South Carolina.

Nelson, John B. 1986. *The Natural Communities of South Carolina*. Columbia: South Carolina Wildlife and Marine Resources Department.

Porcher, Richard D. In Press. *Wildflowers of the Carolina Lowcountry*. Columbia: University of South Carolina Press.

Photographs:

54. Sewee Indian Midden after Hurricane Hugo, 1990

55. Shell-mound Bockthorn (*Sageretia minutiflora*), Sewee Indian Midden
Quadrangle: Fenwick, S.C.

Site 48: Penny Creek
Associated Waterway: Edisto River
Ownership: Adjacent land is private
Description:

Penny Creek is a tidal freshwater creek that arises in the coastal area and empties into the Edisto River. It is flanked on either side by freshwater tidal swamp forests. The first mile and a half of the swamp occupies abandoned tidal rice fields. Here the swamp is secondary forests that reclaimed the fields after the fields were abandoned. Embankments that created the rice fields are still evident. The outline of the fields are clearly visible on the topographic map. The swamp forests higher up the creek were undoubtedly timbered in past times; they have recovered today but are not mature tidal swamp forests. A rich mix of trees, vines, shrubs and herbs occurs along the creek. The tidal freshwater marsh plants are especially prominent.

Penny Creek has long been a favorite creek for canoeing.

Significance:

Tidal creek with abandoned rice fields and excellent canoeing and wildflower site.

Photograph:

56. Penny Creek

Site 49: Willtown Bluff Rice Chimney
Associated Waterway: Edisto River
Ownership: Private; Hugh Lane Family of Charleston, S. C.
Description:

There are only 13 brick chimneys still standing in South Carolina that were associated with steam-driven rice mills; the Willtown chimney is one of the thirteen. It is also architecturally important because it is the only chimney with a square base and rounded upper portion. All other structures associated with the mill have long vanished. The chimney is still in good condition; evidence is present that indicates it has been stabilized by the owners. An interesting feature of the chimney is the elevated opening that connected it to the boiler. Only one other chimney has this feature. No research has been done to determine the date the mill and chimney were constructed.

Significance:

One of thirteen remaining rice chimneys in South Carolina.

References:

Heyward, Duncan C. 1937. Seed from Madagascar. Chapel Hill: The University of North Carolina Press.

Porcher, Richard D. 1987. Rice Culture in South Carolina: A Brief History, The Role of the Huguenots, and Preservation of its Legacy. Transactions of the Huguenot Society 92:1-22.

Photograph:

57. Rice Chimney at Willtown Bluff

Quadrangle: Fort Moultrie, S.C.

Site 50: Buzzard's Island Shell Ring

Associated Waterway: Copahee Sound

Ownership: South Carolina Nongame and Heritage Trust Program

Description:

Buzzard's Island Shell Ring was deeded to the South Carolina Nongame and Heritage Trust Program, S. C. Department of Natural Resources, which formed a Stewardship Committee to assist in protecting the ring. I serve on this committee. Buzzard's Island was designated a nationally significant site in 1970 by The National Register of Historic Places; it was nominated to the Statewide Assessment of Cultural Sites.

Buzzard's Island supports a woody community with a mix of maritime and marl forest species. Two species of note, both calcifites, are present. Shell-mound buckthorn (*Sageretia minutiflora*) is considered rare and is conspicuous on the mound. Buckthorn (*Rhamnus caroliniana*), also found in inland marl forest, is also conspicuous as a medium-size tree. Maritime species of note are live oak, southern red cedar, Spanish moss, tough bumelia and cabbage palmetto. Although the forest suffered damage from Hurricane Hugo, most of the trees are still standing. This shell ring is also used as a roosting area by wood storks, a Federally Endangered Species.

Significance:

Prehistoric Indian Shell Ring (Indian midden) with rare plants and wood storks, a Federally Endangered Species.

References:

- Barry, John M. 1980. The Natural Vegetation of South Carolina. Columbia: University of South Carolina Press.
- Bierer, Bert W. 1972. South Carolina Indian Lore. Columbia: The State Printing Company.
- Dorroh, Rita J. 1971. The Vegetation of Indian Shell Mounds and Rings of the S. C. Coast. Columbia: Unpublished Master's Thesis, University of South Carolina.
- Features and Profiles. News Letter of the Archaeological Society of South Carolina, Inc. September-October, 1994.
- Nelson, John B. 1986. The Natural Communities of South Carolina. Columbia: South Carolina Wildlife and Marine Resources Department.
- Porcher, Richard D. In Press. Wildflowers of the Carolina Lowcountry. Columbia: University of South Carolina Press.

Photograph:

58. Buzzard's Island Shell Ring

Site 51: Crow Island Shell Ring (Indian Midden)
 Associated Waterway: Copahee Sound
 Ownership: Private; Philip Porcher family of Mt. Pleasant
 Description:

Crow Island Shell Ring lies just north of Buzzard's Island Shell Ring. It is privately owned and not protected by the state. I see no reason why it should not be as significant as Buzzard's Island Shell Ring; however, I find nothing in the literature about Crow Island. It supports a maritime forest community; however, I observed no calcifites such as shell-mound buckthorn and buckthorn. The woody community suffered considerable damage from Hurricane Hugo.

Significance:

Prehistoric Indian Shell Ring (Indian Midden).

References:

- Barry, John M. 1980. The Natural Vegetation of South Carolina. Columbia: University of South Carolina Press.
- Bierer, Bert W. 1972. South Carolina Indian Lore. Columbia: The State Printing Company.
- Dorroh, Rita J. 1971. The Vegetation of Indian Shell Mounds and Rings of the S. C. Coast. Columbia: Unpublished Master's Thesis, University of South Carolina.
- Features and Profiles. News Letter of the Archaeological Society of South Carolina, Inc. September-October, 1994.
- Nelson, John B. 1986. The Natural Communities of South Carolina. Columbia: South Carolina Wildlife and Marine Resources Department.
- Porcher, Richard D. In Press. Wildflowers of the Carolina Lowcountry. Columbia: University of South Carolina Press.

Photograph:

59. Crow Island Shell Ring

Site 52: Accreted Beach at Sullivans Island
Associated Waterways: Atlantic Ocean and Charleston Harbor
Ownership: Town of Sullivans Island
Description:

Accreted Beach is a section of dunes and beach open to the public yearround. It is reached from either Station 18 or Station 16; limited parking is available at the end of each road. Trails lead from the end of the roads to the beach.

Accreted Beach harbors well-developed coastal dunes and beach communities with numerous wildflowers and wildlife. It provides the public with an easily accessible, outstanding natural area.

Significance:

Outstanding coastal natural area.

Photograph:

60. Accreted Beach at Sullivans Island

Quadrangle: Jacksonboro, S. C.

Site 53: Edisto Spruce Pine Natural Area
Associated Waterways: Edisto River and Penny Creek
Ownership: Westvaco Corporation
Description:

Edisto Spruce Pine Natural Area harbors in the center a fifty-acre tract a mature spruce pine-beech forest. This community probably corresponds to Nelson's (1986) spruce pine-mixed hardwood forest. There has not been a complete floristic survey done of the site. Westvaco Corporation has identified the site as a Natural Area and will protect it. The Society of American Foresters has determined it exemplifies a unique vegetation type.

The canopy is dense and primarily consists of spruce pine and American beech. Other trees include American holly, cherry-bark oak and sweet-gum. The dense canopy precludes a significant shrub layer. A complete species list of the herb layer is not available; however, I identified the following species in January: *Tipularia discolor*, *Hexastylis arifolia*, *Mitchella repens*, *Epifagus virginiana*, *Monotropa uniflora*, *Polystichum acrostichoides* and *Botrychium* sp. Undoubtedly numerous spring ephemerals will be identified. The site is also habitat for *Trillium pusillum*, a Category 2 species known from only Beidler Forest.

The site also offers excellent research opportunities for both students and professional scientists.

Significance:

Rare spruce pine-beech community and rare plants.

Reference:

Nelson, John B. 1986. *The Natural Communities of South Carolina*. Columbia: South Carolina Wildlife and Marine Resources Department.

Photograph:

61. Spruce Pine-Beech Community, January 1995, Edisto Spruce Pine Natural Area

Quadrangle: James Island, S.C.

Site 54: Black Island
Associated Waterways: Lighthouse Creek and Schooner Creek
Ownership: Private: John D. Ohlandt
Description:

Black Island is a 2000-acre marsh island. The upland portion is formed by a series of relic dunes that run the length of the island. The island appears as a pristine entity today; however, there is evidence of canals and dikes and a pond may have been formed by diking one of the sloughs. There is also evidence of timbering. Numerous wading birds use the slough and pond. The upland vegetation is a young maritime forest. On one ridge, slash pine (*Pinus elliottii*) is the dominant tree species. Live oak is common on the upland as a component of the maritime forest. Other coastal communities present are salt marshes, salt flats and salt shrub thickets.

I am not aware of any extensive bird surveys of the island; however, my limited contact with the island indicates it is used by a variety of local waterfowl.

The owner has granted an easement on the island to the Lowcountry Open Land Trust.

Significance:

Presently undisturbed, isolated marsh island and habitat for local waterfowl.

Photographs:

62. Aerial View of Black Island, 1994

63. Interior Slough and Maritime Forest of Black Island, 1974

Site 55: Long Island
Associated Waterways: Folly River, Folly Creek and several smaller marsh creeks
Ownership: Private
Description:

Long Island is a two-mile, marsh island. The upland supports a maritime forest; surrounding the island are *Spartina* marshes, salt flats and salt shrub thickets. Numerous brackish ponds are present. The entire island complex is an outstanding wildlife refuge. An old causeway runs from Oak Island to Long Island. An attempt was made to develop Long Island in the 1980's. Developers claimed that the causeway was intact and thus had the right to use it as access. It was ruled, however, that the causeway had been breached in numerous places and the permit to use the causeway was denied. No further attempts have been made to develop Long Island.

Long Island has a history of use as evidenced by the old causeway. It has been used for hunting and camping, and there are signs of past timbering. Old roads are still visible. These activities, however, are not conspicuous today and it is a pristine marsh island. It is easily accessible by boat, or by the causeway; exceptional educational activities are possible if the island could be purchased by a private or governmental agency.

Significance:

Outstanding natural marsh island with outstanding educational potential.

Site 56: Bird Key
Associated Waterways: Folly River, Stono Inlet and Atlantic Ocean

Ownership: South Carolina Department of Natural Resources

Description:

Bird Key is a small sand-spit between Folly Island and Kiawah island. It is a major rookery for birds such as the Brown Pelican, Royal Tern, Sandwich Tern and Least Tern. This is a fragile site and protected by the DNR.

Significance:

Major bird rookery.

Photograph:

64. Aerial View of Bird Key

Site 57: Cummings Point

Associated Waterways: Charleston Harbor and Schooner Creek

Ownership: Undetermined

Description:

Cummings Point occupies the northern tip of Morris Island. The tip is accreting northward. A typical system of dunes and swales is evident, with maritime shrub thickets developing in the swales. Further back from the dunes a maritime forest is developing. As the dunes advance, succession occurs; maritime shrub communities are followed by maritime forests.

Cummings Point offers excellent recreational activities and educational values in close proximity to Charleston. It must be reached by boat.

Significance:

Excellent example of succession of maritime communities on accreting dunes and habitat for nesting birds.

Photograph:

65. Aerial View of Cummings Point, 1975

Site 58: Dill Wildlife Refuge

Associated Waterway: Stono River

Ownership: Charleston Museum

Description:

The Dill Refuge is a 600-acre tract along the Stono River owned by the Charleston Museum. It is operated as a nature and historical educational center. A visitor's center is planned and construction of a system of nature trails has begun. The museum staff is conducting research on birds. Habitat is being maintained for a variety of bird-life, including construction of a pond for wading birds. Archeological studies have been conducted to gain insight on life-styles of early Lowcountry settlers and slaves.

A series of four batteries of Civil War era occur along the Stono River and their history will be featured in forthcoming brochures for the public. The batteries will be preserved.

Most of the upland area has been highly disturbed by past farming activities, and Hurricane Hugo severely damaged the mature forests. However, pristine marine communities occur along the Stono River that offer valuable educational opportunity.

The Dill Refuge is easily accessible to schools in the Charleston area.

Significance:

Major wildlife habitat and educational center of the Tri-county area.

Quadrangle: Johns Island, S.C.

Site 59: Drayton Hall Rice Fields

Associated Waterway: Ashley River

Ownership: National Trust for Historic Preservation

Description:

Early on rice in South Carolina was grown in dammed-off salt creeks or sloughs to prevent the influx of salt water. Little is known about the location of these early rice fields. This author discovered remains of three embankments in the salt water slough at Drayton Hall that indicates the slough may represent an early rice field, perhaps dating to the late 1600 or early 1700's. Over the years, the embankments have been eroded; however, enough of the banks remain to see that they divided the slough into three separate fields. The present impoundments at Drayton Hall may have been reservoirs to supply freshwater to the fields.

Significance:

Possibly one of the earliest inland rice fields in South Carolina.

References:

Carney, Judith, and Richard D. Porcher. 1993. Geographies of the Past: Rice, Slaves and Technological Transfer in South Carolina. *Southeastern Geographer* Vol. XXXIII (2): 127-147.

Heyward, Duncan C. 1937. *Seed from Madagascar*. Chapel Hill: The University of North Carolina Press.

Photograph:

66. Salt Slough, Former Inland Rice Field, Drayton Hall

Quadrangle: Ocean Bay, S.C.

Site 60: Wambaw Swamp Wilderness Area

Associated Waterways: Coffee Creek Swamp and Halfway Creek

Ownership: United States Forest Service

Description:

Wambaw Swamp Wilderness Area comprises 4850 acres of non-alluvial swamp gum-red maple/sweet bay swamp forests. It is a major swamp system and acts as a wildlife refuge. Hurricane Hugo damaged the large timber. It was designated a Wilderness Area in 1980.

Significance:

Major wetland area and wildlife habitat.

Reference:

Nelson, John B. 1986. *The Natural Communities of South Carolina*. Columbia: South Carolina Wildlife and Marine Resources Department.

Site 61: Halfway Creek Road Carolina Bay

Associated Waterway: Northhampton Creek
Ownership: United States Forest Service
Description:

Halfway Creek Road Carolina Bay harbors two communities: a pond cypress savanna and a pond cypress-swamp gum swamp forest. Both communities suffered little damage from Hurricane Hugo. Both communities are well-developed and any sign of past disturbance is absent. A complete floristic survey has not been done of the bay. Porcher listed some of the more conspicuous species in the 1982 report to the Forest Service. Of note was sneezeweed (*Helenium pinnatifidum*). Geologically this Carolina bay is well delineated from the air and is of the asymmetrical shape. A conspicuous sand ridge occurs on the southeastern side.

Significance:

Well defined Carolina bay, pond cypress savanna and rare plants.

References:

Porcher, Richard D. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.

_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

Savage, Henry. 1982. The Mysterious Carolina Bays. Columbia: University of South Carolina Press.

Photograph:

67. Pond Cypress Savanna Community, Halfway Creek Road Carolina Bay

Site 62: Lethcoe Road Schwalbea
Associated Waterways: Cooter Creek and Withey Wood Canal
Ownership: United States Forest Service
Description:

This site is a longleaf pine flatwoods community that harbors a population of American chaffseed (*Schwalbea americana*), a Federally Endangered Species. The flatwoods are burned sufficiently by the Forest Service to ensure survival of chaffseed. The site is small, approximately 1/4 acre.

Significance:

Site for American chaffseed, a Federally Endangered Species.

Voucher:

Schwalbea americana L.; Richard D. Porcher #2346; 21 June, 1994; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Porcher, Richard D. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

_____. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish

and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Photograph:

68. Longleaf Pine Flatwoods, Site for Chaffseed, Lethcoe Road Schwalbea

Site 63: Halfway Creek Road Schwalbea
Associated Waterways: Northampton Creek and Cooter Creek
Ownership: United States Forest Service
Description:

This site harbors a large population of American chaffseed (*Schwalbea americana*), a Federally Endangered Species. The population was located in 1994. Plants occur on both sides of Halfway Creek Road (plants on the north side are in Berkeley County; however, the site is listed only once in this report). The habitat is a sandy, longleaf pine flatwoods maintained in an open condition by regular, prescribed fire.

Significance:

Site for Federally Endangered Species (American chaffseed).

Voucher:

Schwalbea americana L.; Richard D. Porcher #2341; 26 May, 1994; The Citadel Herbarium.

References:

Federal Register. Endangered and Threatened Wildlife and Plants. 50 CFR 17.11 & 17.12. August 23, 1993.

Porcher, Richard D. 1980. Inventory of Populations of Proposed Endangered and Threatened Species of Vascular Plants on the Francis Marion National Forest in Berkeley and Charleston Counties. Final Report for Contract #53-43ZP-8-00008. Atlanta: United States Forest Service, Regional Office.

_____. 1982. Inventory of Natural Areas in the Francis Marion National Forest. Final Report. Atlanta: United States Forest Service, Regional Office.

_____. 1991. Post-Hugo Study on Ecological Status of Natural Areas on the Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

_____. 1993. Botanical Inventory of The Francis Marion National Forest. Final Report. Columbia: United States Forest Service.

_____. 1994. Monitoring Study of American Chaffseed (*Schwalbea americana*) and Transplant Study of Pondberry (*Lindera melissifolia*). Final Report. U. S. Fish and Wildlife Service, Asheville, N. C. office, and South Carolina Heritage Trust Program, Columbia, S.C.

Photograph:

69. Longleaf Pine Flatwoods, Site for Chaffseed, Halfway Creek Road Schwalbea

Quadrangle: Ravenel, S.C.

Site 79: Middleton Plantation Inland Rice Fields and Mill

Note:

Middleton Plantation lies both in Charleston and Dorchester counties. Most of the property lies in Dorchester County; therefore it is covered under the Stallville, S.C., Quadrangle in Dorchester County.

Site 64: Tea Farm County Park
Associated Waterways: Wallace Creek and Caw Caw Swamp
Ownership: Charleston County Parks and Recreation Commission
Description:

Tea Farm County Park is a 640-acre tract of land along Wallace Creek. It is being developed into a county park and is expected to open in 1996. Facilities will include nature trails, parking, a visitor's center and former rice fields managed for waterfowl.

This author was part of the team that inventoried the land for development of the park (Jaeger Company, 1994). During the study, a virtually intact, inland rice field was discovered. The field has been mapped (Appendix Map 4). The only other inland rice field in the coastal area that has been thoroughly documented is on the Bluff Plantation Wildlife Sanctuary in Berkeley County (Appendix Map 3). Remains of two trunks were discovered and plans are to have them excavated, documented and then covered up again in place. Models will be made to put on display. One of the trunks may represent an early modification of the plug trunk first used in the fields in the 1700's (Doar, 1936).

The inland field consists of two reservoirs, five individual fields and flanking canals that fed and drained water from the fields.

Tea Farm also has a variety of other natural areas that will contribute to Tea Farm County Park becoming a focal area of the Lowcountry.

Significance:

Nature area; county park; inland rice field; archeological sites.

References:

- Carney, Judith, and Richard D. Porcher. 1993. Geographies of the Past: Rice, Slaves and Technological Transfer in South Carolina. *Southeastern Geographer* Vol. XXXIII (2): 127-147.
- Doar, David. 1936. Rice and Rice Planting in the South Carolina Low Country. Charleston: The Charleston Museum.
- Heyward, Duncan C. 1937. Seed from Madagascar. Chapel Hill: The University of North Carolina Press.
- The Jaeger Company. 1994. Tea Farm Park Master Plan Report. Gainesville, GA.
- Porcher, Richard D. 1985. A Field Guide to The Bluff Plantation. New Orleans: The Kathleen O'Brien Foundation.
- _____. 1987. Rice Culture in South Carolina: A Brief History, The Role of the Huguenots, and Preservation of its Legacy. *Transactions of the Huguenot Society* 92:1-22.

Photographs:

70. Cypress Tree in Abandoned Inland Rice Field, Tea Farm County Park
71. Remains of Trunk at Head of Inland Reservoir, Tea Farm County Park

Site 65: Plug Trunk at Tea Farm County Park
Associated Waterways: Wallace Creek, Tea Farm Creek and Caw Caw Swamp
Ownership: Charleston County Parks and Recreation
Description:

One of the mysteries of the rice industry are “plug trunks.” David Doar (1936) shed some light on the subject. He quoted in his book *Rice and Rice Planting in the South Carolina Low Country* an account of a fellow planter in the Santee Delta who unearthed the granddaddy of plug trunks: “It was simply a hollow cypress log with a large hole from top to bottom. When it was to be stopped up a large plug was put in tightly and it acted on the same principle as a wooden spigot to a beer keg.”

Many historians believe the plug trunk was of African origin, the idea brought with slaves from rice growing areas. The only record of a finding of a plug trunk is the one quoted above; no intact plug trunk has been found and preserved. During my study of Tea Farm, a trunk was found protruding from a canal adjacent to former rice fields. Most of the trunk is buried in the bank; however, enough protrudes so that visible are two notches on the end. It well may be that these notches serve to hold a board acting as a plug. The trunk is not a hollow log like the original plug trunks; it appears to be formed by four boards. Nonetheless, it well may be the closest structure to a plug trunk, and could date back to the 1700’s. If it is a modification of the plug trunk, it would be a major discovery in the history of rice culture in South Carolina.

There are plans by Parks and Recreation to investigate the feasibility of having the trunk excavated and preserved.

Significance:

Major artifact of the rice culture.

Reference:

Doar, David. 1936. *Rice and Rice Planting in the South Carolina Low Country*.

Charleston: The Charleston Museum.

Photograph:

72. Remains of Plug Trunk, Tea Farm County Park

Site 66: Steam Engine Mount on Wallace Creek
Associated Waterways: Wallace Creek and Caw Caw Swamp
Ownership: Private (McLeod Family)
Description:

Along the edge of a canal built for adjacent rice fields is an engine mount for a horizontal steam engine. Horizontal steam engines were introduced in the early 1800’s to drive the mills to process rice in the Carolina Lowcountry. This author has documented numerous sites for these mills. In the most complete mills, there are the following structures: a steam engine on a brick foundation; a boiler adjacent to the steam engine; an underground brick viaduct leading from the boiler mount to a brick chimney; a brick chimney; and the mill.

The site at Wallace Creek appears to have only the engine mount. The engine mount is situated on a narrow bank; behind the mount is a concrete platform. The bricks used for the mount date much later than the type bricks in the other mills I have studied. There is also a large,

cast iron pipe projecting from the bank opposite the engine mount and a vertical pipe (3" diameter) seen at low tide from which artesian water gushes.

If these structures are remains of a rice mill, they must date to the late 1800's or early 1900's, a date I consider unusual. By this time, the industry was in its final stages and mills were not being built.

Significance:

Remains of an abandoned horizontal steam engine mount.

Reference:

Porcher, Richard D. 1987. Rice Culture in South Carolina: A Brief History, The Role of the Huguenots, and Preservation of its Legacy. Transactions of the Huguenot Society 92:1-22.

Photograph:

73. Steam Engine Mount on Wallace Creek

Quadrangle: Rockville, S.C.

Site 67: Deveaux Bank—Alexander Sprunt Jr., Sanctuary

Associated Waterways: North Edisto River and Atlantic Ocean

Ownership: State of South Carolina

Description:

Deveaux Bank is a small sand-spit at the mouth of the North Edisto River. Before Hurricane David in 1979, it was a major bird rookery, especially for the endangered Brown Pelican. The hurricane greatly reduced the size and height of the spit and it was abandoned as a rookery. In the years since the hurricane, the island has accreted to a point that it is again a rookery for such birds as the Brown Pelican, Royal Tern, Sandwich Tern and Least Tern.

Deveaux Bank is owned by the state of South Carolina and leased to the National Audubon Society and is dedicated as a memorial to Alexander Sprunt, Jr. An Audubon warden is on the job to prevent undue disturbance.

Significance:

Major bird rookery.

Reference:

Callison, Charles H. (Editor). Islands of Life: The National Audubon Society Sanctuaries. New York: National Audubon Society.

Photographs:

74. Deveaux Bank Prior to Hurricane David

75. Deveaux Bank 1994

Site 68: Botany Bay Island

Associated Waterways: North Edisto River, Ocella Creek and South Creek

Ownership: Private; Conservation Easement Held by The Nature Conservancy

Description:

Botany Bay Island is a 500-acre barrier island at the mouth of the North Edisto River. The owners have granted a conservation easement to The Nature Conservancy that restricts development to a small number of buildings. Presently it is uninhabited with the only improvement one paved road and a landing with a dock.

The island supports a mature maritime forest with several ponds within the uplands. The eastern side has a broad beach used by loggerhead turtles for nesting. Botany Bay did not suffer any damage from Hurricane Hugo and is now the best example of a undisturbed maritime forest along the Charleston coast. The forests, beaches and adjacent salt marshes are a major wildlife area.

Significance:

Undeveloped barrier island.

Photograph:

76. Aerial View of Botany Bay Island

Site 69: Camp St. Christopher Maritime Forest

Associated Waterways: Privateer Creek and North Edisto River

Ownership: Episcopal Diocese of South Carolina

Description:

Camp St. Christopher is a 300-acre tract on Seabrook Island, a major resort island along the Carolina coast. Buildings associated with the camp occupy about 25 acres of the 300-acre tract. When the resort area of Seabrook is fully developed, the undeveloped section of the 300-acre tract will be the only remaining undisturbed forests on the island.

The maritime forest at Camp St. Christopher is a mature forest. Excellent examples of the coastal dunes that the forest developed on are present. Large examples of live oak, bull bay, spruce pine, palmetto and laurel oak can be seen in the forest. Although there was disturbance in the past to the forest (timbering?), it is presently mature and an excellent example of the maritime community along the Charleston coast that is becoming rare. This forest did not suffer any damage from Hurricane Hugo.

Significance:

Undisturbed, mature maritime forest.

Photograph:

77. Maritime Forests on Seabrook Island at Camp St. Christopher

Site 70: Fig Island Shell Mounds

Associated Waterways: North Edisto River and Ocella Creek

Ownership: Private

Description:

Three islands comprise this site. Two are Indian shell middens; the origin of the third, larger island is undetermined. One midden (Photograph 78) is an excellent example of the circular shell midden. The other midden is horseshoe shaped. A population of shell-mound buckthorn (*Sageretia minutiflora*), a rare shrub along the coast, occurs on the circular mound.

The large island harbors a rare community, the marl forest or calcareous cliff community. There is uncertainty on the classification of these two communities. Nelson (1986) gives the

community “calcareous cliff” for the community on marl mixed with shell “hash” along river bluffs of the outer coastal plain. The marl forest, according to Nelson, occurs over buried or exposed marl. Yet many of the species are same, called calciphytes (plants associated with calcium).

Whatever the classification, the island harbors a rare assemblage of species. Documented for the larger island are southern sugar maple (*Acer saccharum* ssp. *floridanum*), *Trillium cuneatum* (little sweet betsy) and basswood (*Tilia* sp.). A floristic inventory has never been conducted of this larger island.

Most Indian middens along the coast have been destroyed for their shell content (Bierer, 1972). Preservation of the remaining middens must be a major conservation effort.

Significance:

Indian middens with rare plant communities.

References:

- Barry, John M. 1980. *The Natural Vegetation of South Carolina*. Columbia: University of South Carolina Press.
- Bierer, Bert W. 1972. *South Carolina Indian Lore*. Columbia: The State Printing Company.
- Dorroh, Rita J. 1971. *The Vegetation of Indian Shell Mounds and Rings of the S. C. Coast*. Columbia: Unpublished Master's Thesis, University of South Carolina.
- Nelson, John B. 1986. *The Natural Communities of South Carolina*. Columbia: South Carolina Wildlife and Marine Resources Department.
- Porcher, Richard D. In Press. *Wildflowers of the Carolina Lowcountry*. Columbia: University of South Carolina Press.

Photographs:

78. Aerial View of Fig Island Circular Shell Midden
79. Marl Forest with Southern Sugar Maple, Fig Island Mound

Quadrangle: Santee, S.C.

Site 71: Wambaw Creek Wilderness Area

Associated Waterway: Wambaw Creek

Ownership: United States Forest Service

Note:

Wambaw Creek Wilderness Area occurs in Berkeley and Charleston counties and in two quadrangles, Santee and Honey Hill. Its boundary is delineated on both quadrangles although its description is given under the Santee, S.C., Quadrangle.

Description:

Wambaw Creek is a nationally designated Wilderness Area. It is a tidal freshwater creek with associated tidal swamp forests. The swamps along the lower end of the creek were cleared and banked for rice fields. When rice growing ceased along Wambaw Creek, secondary tidal swamp forests reclaimed the fields. Earthen banks are still visible in the swamps. The remains of one rice trunk can be seen at low water.

The upper swamps were timbered; still, large cypress trees are in evidence, left standing for undetermined reasons.

Wambaw Creek is a favorite creek for canoeing and for educational field trips. It is a major refuge for wildlife and harbors numerous rare plants and animals.

Significance:

Federally designated Wilderness Area.

Reference:

Forest Service Map. 1988 (Revised). U. S. Department of Agriculture, Forest Service.
Atlanta, GA.

Photograph:

80. Wambaw Creek, Wambaw Creek Wilderness Area

Quadrangle: Sewee Bay, S.C.

Site 72: Sewee Road (SC-584) Eulophia

Associated Waterway: Wando River

Ownership: Private

Description:

A small population of *Eulophia ecristata* was found at this site in 1972. The habitat is a sandy, longleaf pine forest with scattered oaks. On several years I looked for the orchid, but could not relocate it. The last time I visited the site was in 1993.

Significance:

U. S. Fish and Wildlife Service list this species as a Category 2 species.

Reference:

Federal Register. Plant Taxa for Listing as Endangered or Threatened Species: Notice of Review. Vol. 58, No. 188. September 30, 1993.

Voucher:

Eulophia ecristata (Fernald) Ames; Richard D. Porcher #554; 29 August, 1972; The Citadel Herbarium.

Site 73: Mayrants Reserve and Penny Dam Reserve of Fairlawn Plantation

Associated Waterway: Wando River

Ownership: Boardman Carton Trusts

P.O. Box 1799

Avon, Colorado 81620

Description:

Mayrants Reserve and Penny Dam Reserve are inland rice reserves that supplied water to adjacent rice fields of Fairlawn Plantation. These reserves date back to the 1700's, the period of inland swamp rice culture. The reserves trapped water from local runoff by use of earthen banks. A trunk-gate system was used to control the flow of water onto the adjacent rice fields. Rice

growing on Fairlawn probably ceased in the late 1700's when rice growing in the Carolinas shifted to the tidal method.

Penny Dam is forested today by a beautiful bald cypress swamp forest, while Mayrants Reserve harbors a mix of wetland communities. Photograph 82 shows the woodland pond in Mayrants Reserve supporting a freshwater marsh and a floating aquatic community. Both reserves serve as excellent waterfowl habitat and have been used as rookeries by wading birds.

No complete botanical survey has been conducted of the reserves; however, I have identified the rare *Thalia dealbata* Roscoe in Mayrants Reserve.

Significance:

Inland rice reserves that are major waterfowl habitat.

References:

Hawley, N. R. 1949. The old rice plantations in and around the Santee Experimental Forest. *Agricultural History* 23:86-91.

Heyward, D. C. 1937. Seed from Madagascar. Chapel Hill: The University of North Carolina Press.

Porcher, Richard D. 1985. A Field Guide to The Bluff Plantation. New Orleans: The Kathleen O'Brien Foundation.

_____. 1987. Rice Culture in South Carolina: A Brief History, The Role of the Huguenots, and Preservation of its Legacy. *Transactions of the Huguenot Society* 92:1-22.

Photographs:

81. Penny Dam Reserve, Fairlawn Plantation

82. Mayrants Reserve, Fairlawn Plantation

DORCHESTER COUNTY

Quadrangle: Harleyville, S.C.

Site 74: Dorchester Pond Cypress Depression

Associated Waterways: Marshall Branch and Long Branch

Ownership: Private; Undetermined

Description:

This is a large pond cypress depression with an understory dominated by *Ilex myrtifolia* with scattered savanna areas dominated by *Carex* sp. I found this site in my survey of Dorchester County (Porcher, 1984). I did not do a complete floristic inventory in 1984; I visited the site again in the winter of 1994, so I was again unable to conduct an adequate inventory. I can determine it is possible habitat for the endangered pondberry and Canby's dropwort as well as several Category 2 species. It certainly provides habitat for wildlife. Although in a rural area surrounded by numerous homesites, it appears to be relatively undisturbed. The rareness of pond cypress communities in Dorchester County makes its preservation significant.

Significance:

Rare pond cypress community and possible habitat for rare plants; habitat for waterfowl.

Reference:

Porcher, Richard D. 1984. Inventory of Botanical Natural Areas in Dorchester County, South Carolina. In Douglas A. Rayner (ed.) Inventory of Botanical Natural Areas in Colleton, Dorchester, Horry and Jasper Counties, South Carolina. Columbia: S.C. Wildlife and Marine Resources Department, Division of Wildlife and Freshwater Fisheries.

Photograph:

83. Dorchester Pond Cypress Depression

Quadrangle: Maple Cane Swamp, S.C.

Site 75: Limestone Outcrops at Givhans Ferry State Park

Associated Waterway: Edisto River

Ownership: State of South Carolina

Description:

Givhans Ferry State Park is located along a limestone bluff on the Edisto River. The limestone outcrops in two places: (1) adjacent to the parking lot in front of the Office Community Building is a deep ravine that cuts through the limestone bluff; and (2) upriver from the Community Building where the bluff forms a nearly vertical wall down to the river. Numerous rare species of the marl forest community, a rare community in the coastal area (Nelson, 1986), occur along the ravine and river bluff. Species of note include paw paw, thimbleweed, alumroot and Venus'-hair fern.

Significance:

Marl forest, a rare plant community.

References:

Nelson, John B. 1986. The Natural Communities of South Carolina. Columbia: South Carolina Wildlife and Marine Resources Department.

Porcher, Richard D. 1984. Inventory of Botanical Natural Areas in Dorchester County, South Carolina. In Douglas A. Rayner (ed.) Inventory of Botanical Natural Areas in Colleton, Dorchester, Horry and Jasper Counties, South Carolina. Columbia: S.C. Wildlife and Marine Resources Department, Division of Wildlife and Freshwater Fisheries.

_____. In Press. Wildflowers of the Carolina Lowcountry. Columbia: University of South Carolina Press.

Photograph:

84. Limestone Bluff along Edisto River, Givhans Ferry State Park

Site 76: Givhans Savanna

Associated Waterway: Edisto River

Ownership: Private

Description:

Porcher (1984) reported that Givhans Savanna was one of the two savannas in Dorchester County in a natural state. Givhans savanna was dominated by longleaf pine and pond pine and had a well-developed herbaceous flora. Species included numerous orchids (including the rare *Habenaria nivea*) and carnivorous plants. The extensive disappearance of savanna lands in the

South (Schnell, 1976 and Flokerts, 1982) makes preservation of remaining savannas critical and I listed Givhans Savanna a Site of Local Significance.

Givhans Savanna has been timbered since 1984 and planted in loblolly pine; however, the stand of loblolly that developed after planting was not dense and the savanna will retain much of its character. Accordingly, Givhans Savanna still remains an important natural site.

Significance:

Rare longleaf pine savanna community.

References:

Folkerts, G. W. 1982. The Gulf Coast pitcher plant bogs. *American Scientists* 70(3):260-67.

Nelson, John B. 1986. *The Natural Communities of South Carolina*. Columbia: South Carolina Wildlife and Marine Resources Department.

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Photograph:

85. Givhans Savanna in 1994

Site 77: Givhans Eulophia

Associated Waterway: Edisto River

Ownership: Givhans Ferry State Park

Description:

This site for spiked medusa (*Eulophia ecristata*), a Category 2 species, (Federal Register, 1993) was found by Doug Rayner on 3 September, 1982. It is located 1.05 miles northwest on S. C. 30 from its junction with S. C. 61. I looked for *Eulophia* at this site in 1983 (Porcher, 1984), but it was not present. Like many orchids, however, it may stay underground for several years before producing its above-ground growth, making it difficult to find again.

The habitat for this site was reported as a pine-broomsedge savanna by Rayner. Today it has grown up into a dense loblolly pine-sweetgum sapling-wax myrtle forest. Good habitat still remains along the edge of the roadbank.

Significance:

Site for spiked medusa, a Category 2 species.

References:

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S.C. Wildlife and Marine Resources Department, Division of Wildlife and Freshwater Fisheries.

Quadrangle: Pringleton, S.C.

Site 78: Francis Beidler Forest
Associated Waterway: Four Holes Swamp
Ownership: National Audubon Society and The Nature Conservancy
Description:

Francis Beidler Forest is a National Audubon Sanctuary in South Carolina's Four Holes Swamp and contains the largest remaining stand of original growth bald cypress and tupelo gum trees in the world. It is recognized by the Department of Interior as a National Natural Landmark. It is a bottomland forest ecosystem along Four Holes Swamp, a low gradient, brown water, swamp-river floodplain system that runs for approximately sixty miles through the coastal plain; it also has steep bluffs and upland hummocks that harbor a variety of plant communities. A Visitor's Center is maintained all year by the Audubon Society.

It harbors many rare plants and animals. I identified Carolina Trillium (*Trillium pusillum* var. *pusillum*), a Category 2 species. Beidler Forest is also the site for numerous scientific studies on swamp ecology.

Carr (1971) and Dennis (1988) both give vivid accounts of the beauty of Four Holes Swamp, making it easy to see why it is nationally recognized.

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Significance:

Nationally recognized bald cypress-tupelo gum swamp ecosystem.

Voucher:

Trillium pusillum Michaux *pusillum*; Richard D. Porcher #1246a; 11 March, 1977; The Citadel Herbarium.

Photograph:

86. Bald Cypress-Tupelo Gum Community, Francis Beidler Forest

Site 79: Four Holes Creek South of U. S. 78
Associated Waterway: Four Holes Swamp
Ownership: Westvaco Corporation
Description:

The section of Four Holes Swamp included in this site is a mile section south of U. S. 78. On the west side of the creek that lies within the Four Holes Swamp ecosystem is a high bluff that supports a rich beech woods with a rich flora of herbaceous wildflowers including species such as bloodroot and heartleaf. On the east side is a bottomland forest system including two communities: the bald cypress-tupelo gum community and the hardwood bottom community.

All three communities on this site are mature and well-developed. To my knowledge there have been no biological surveys of this area.

Significance:

Pristine area with three significant, coastal communities.

Photograph:

87. Four Holes Creek

Quadrangle: Stallville, SC

Site 80: Middleton Plantation Inland Rice Fields and Mill
Associated Waterways: Horse Savanna and Bear Swamp
Ownership: Private
Description:

This portion of Middleton Plantation lies on the west side of Highway 61. It is approximately 6000 acres and consists of a mix of forested communities. Hurricane Hugo severely damaged the upland forests. The area that I consider significant is the former inland rice fields that now support a mature bald cypress swamp. The acreage of the swamp is considerably less than the 6000 acres; however, I have no data on its size. An extensive and impressive system of dikes and canals ramify throughout the swamp and were used to control the flow of water to the inland rice fields. My knowledge of this site comes from having been a member of Middleton Hunt Club when it had the lease on Middleton Plantation. Although I have not done a floristic survey of the swamp or documented the layout of the fields and dikes, I have been in the swamp enough times to verify its significance.

Associated with the inland rice fields are the remains of a steam-powered rice mill. Only the base of the chimney is visible; officials of Middleton Plantation have no records or photographs of the mill and no archeological work has been done on the mill site.

The cypress swamp is a major habitat for wildlife. Wild turkeys, deer and significant numbers of waterfowl use this swamp.

Significance:

Former inland rice fields that today support a mature bald cypress swamp; remains of rice mill; and major habitat for wildlife.

Photograph:

88. Remains of Brick Chimney of the Steam-driven Rice Mill, Middleton Plantation

Part IV. Management Recommendations:

The sites listed in this report as significant are very diverse and require different management policies to insure their integrity.

Physical remains of the rice industry, such as the chimneys at Middleburg and The Blessing plantations, should not be subjected to any movements due to construction. Artifacts such as steam engines should not be moved without consultation with preservation experts; trunks and other buried structures should not be excavated by anyone but qualified archaeologists.

Upland sites that harbor American chaffseed are far enough removed from waterways that they will not be effected by activities within the associated waterways. If, however, chaffseed is located on any upland site owned or managed by the CHP, it must be burned on a regular basis to maintain the flatwoods community. In these situations, CHP should contract with qualified forestry management companies to conduct the prescribed burning.

No upland wetland communities, such as Big Ocean Bay Natural Area or Wambaw Creek Carolina Bay, should be subjected to activities such as ditching that would change the hydrology of the site. Ditching, even if somewhat removed from the site, lowers the water table and results in undesirable floral and faunal changes.

Large tracts of land, such as Bluff and Medway plantations, are too complex and diverse to include one management recommendation. Rather CHP should contact the managers of these lands before any water-related activity takes place to jointly develop a management plan that insures the integrity of the site.

Waterways such as Penny Creek and Echaw Creek are susceptible to almost any water-related activity. CHP personnel might also initiate efforts to have these creeks designated as Scenic Rivers or work to obtain protective easements on the adjacent land from landowners.

Part V: Discussion:

I tried to list significant sites that regulatory agencies are probably not familiar with because they are not high-profile sites. Some of the sites that harbor American chaffseed and pondberry, for example, are known to only a few botanists; sites that have significant artifacts from the rice industry are known only to this investigator; and rare plant communities such as the Hillside Herb Bog and Blue Springs are known to a few botanists and officials of the Forest Service. Often regulatory agencies fail to consult other agencies such as the Forest Service and significant sites are overlooked. Some significant sites occur on private property and have never been inventoried except by this investigator; these sites would probably be missed by governmental agencies. By concentrating my efforts on inventorying these sites, I hope to have created a document that is valuable to the CHP.

The eighty sites listed in this study as significant, however, are not the only areas in the Tri-county area that warrant preservation. Numerous bird rookeries, vast expanses of *Spartina* marsh, large islands such as Capers Island, a state park, estuaries such as the Charleston Harbor, and county parks such as Beachwalkers on Kiawah Island should all be monitored by the CHP to insure activities associated with the regulatory agencies do not compromise their natural integrity.

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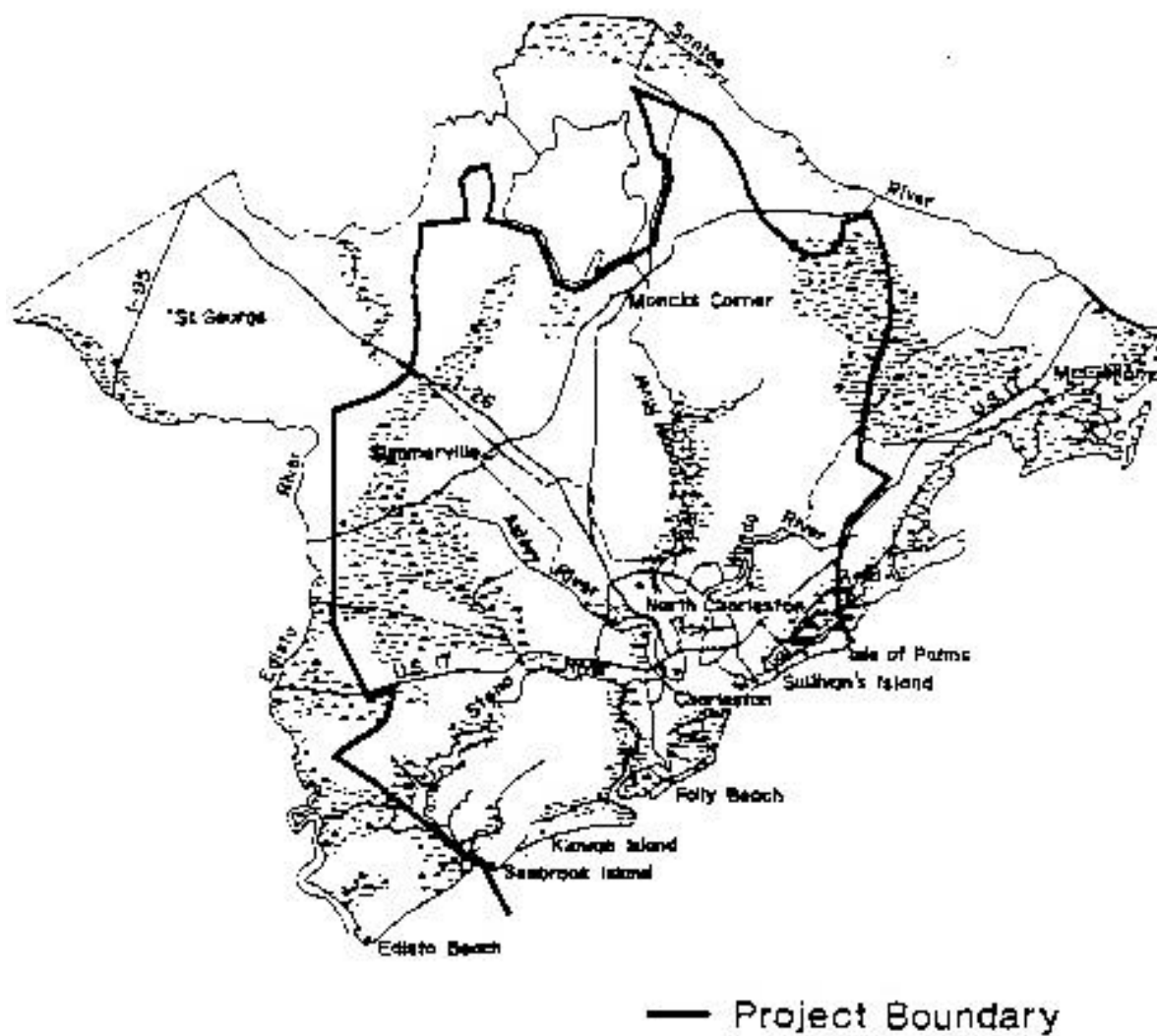
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Charleston Harbor Project

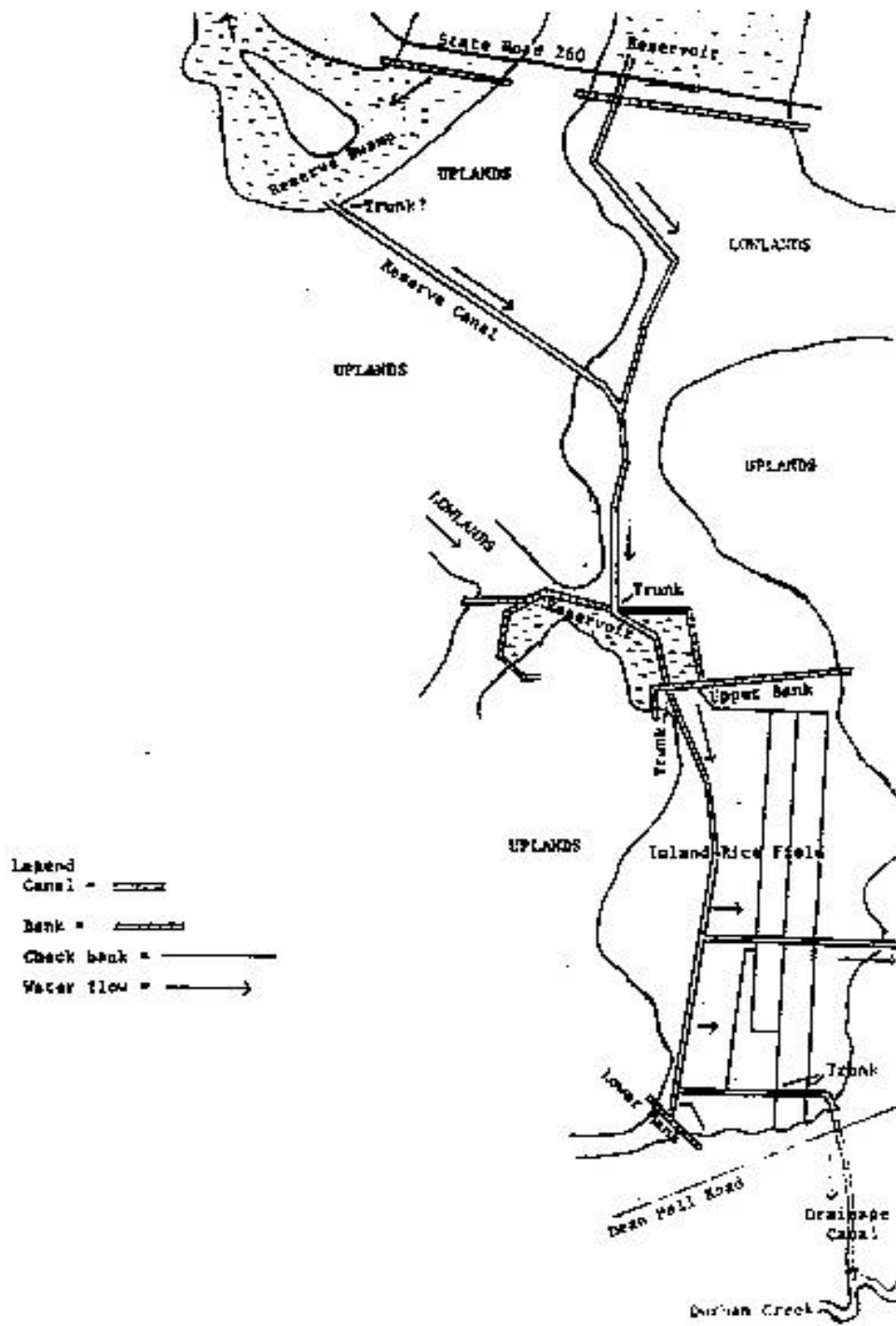


APPENDIX 2. Locations of Natural Areas

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APPENDIX 3. Map of the Bluff Plantation Inland Rice Field

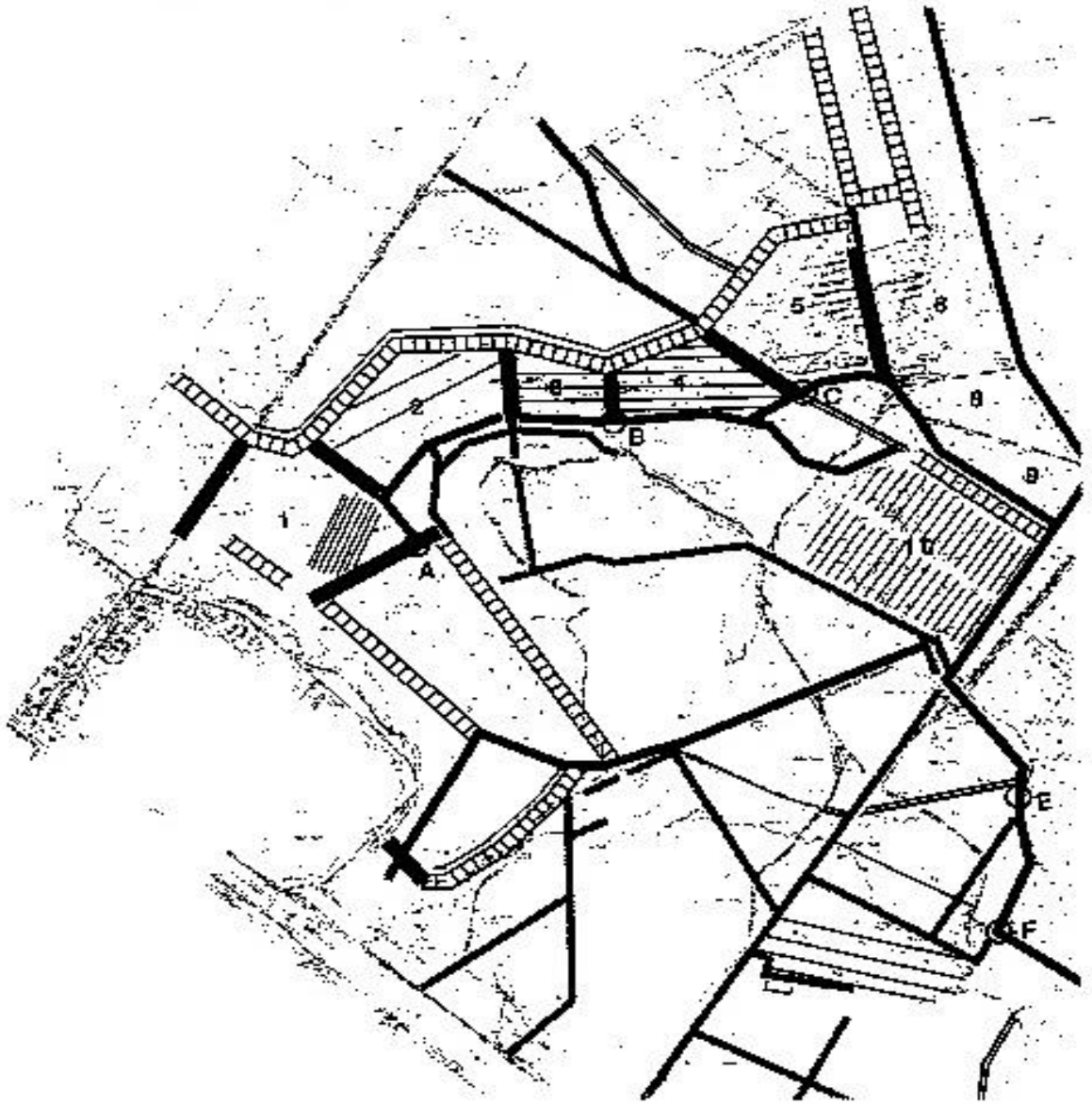
Appendix 3. Map of the Bluff Plantation Inland Rice Field



APPENDIX 4. Map of Inland Rice Field at Tea Farm County Park

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Appendix 4. Map of Inland Rice Field at Tea Farm County Park



APPENDIX 5. Photographs of Natural Areas

**Photos available upon request from SC DHEC-OCRM, 1362 McMillan Avenue, Suite 400,
Charleston, SC 29405*

Number	Natural Area
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Berkeley County

- | | |
|-----|--|
| 1. | Huger Creek Beech Forest before Hurricane Hugo |
| 2. | Huger Beech Beech Forest after Hurricane Hugo |
| 3. | Remains of Undershot Raceway of Limerick Rice Mill |
| 4. | Poplar Dam |
| 5. | Aerial of Little Ocean Bay |
| 6. | Pocosin Community in Little Ocean Bay |
| 7. | Green Pond Bay Pond Cypress Savanna, February 1995 |
| 8. | Awmed Meadow-beauty (<i>Rhexia aristosa</i>) |
| 9. | Longleaf Flatwoods along Forest Route 229, February 1995, Site for Chaffseed |
| 10. | American Chaffseed (<i>Schwalbea americana</i>) |
| 11. | Longleaf Pine Flatwoods with Chaffseed, Cainhoy Lindera Transplant Complex |
| 12. | Clump of Transplanted Lindera, Cainhoy Lindera Transplant Complex |
| 13. | Pond Cypress Savanna, Site for Pondberry, Cainhoy Pond Cypress-Lindera Complex |
| 14. | Pondberry (<i>Lindera melissifolia</i>) |
| 15. | Highway 41 Pond Cypress Complex, Site for Pondberry |
| 16. | Pond Cypress Swamp Forest, Hoover Road Lindera/pitcher-plant Bog |
| 17. | Hoover Road Pond Cypress Savanna, March 1990 |
| 18. | Pineland Depression with Pondberry, Brick Church Road Lindera melissifolia |
| 19. | Longleaf Flatwoods, Site for Chaffseed, Highway 41 Community Complex |
| 20. | Bald cypress-tupelo Gum Bottomland Forest, Lake Guilliard Natural Area |
| 21. | Echaw Creek |
| 22. | Wadboo Creek Marl Forest |
| 23. | Blackstem spleenwort (<i>Asplenium resiliens</i>), Wadboo Creek Marl Forest |
| 24. | Longleaf Pine Flatwoods, Site for Chaffseed, Watson's Schwalbea Site |
| 25. | Lime Sink with Pond Cypress Swamp Forest/Pond, Echaw Road Lindera |
| 26. | Lime Sink with Pond Cypress Swamp Forest/Pond, Honey Hill Sink Holes Complex |
| 27. | Blue Springs |
| 28. | Pond Cypress Savanna, Wambaw Creek Carolina Bay |
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42. Limestone Outcrop along Dutart Creek, Site for Carolina Spleenwort
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45. Remains of Comingtee Rice Mill
46. Sluice-way, Comingtee Rice Mill
47. I-26 Savanna in 1984
48. I-26 Savanna in February 1995
49. Swamp Gum Swamp Forest with *Lindera*
50. Harleston Dam Road Pond Cypress/*Carex* Community
51. Aerial of the Big Opening in 1980, Hellhole Bay Wilderness Area
52. Savanna Community, Big Opening, Hellhole Bay Wilderness Area
53. Bald Cypress-tupelo Gum Swamp Forest, Wassamassaw Swamp Natural Area

Charleston County

54. Sewee Indian Midden after Hurricane Hugo, 1990
55. Shell-mound Bockthorn (*Sageretia minutiflora*), Sewee Indian Midden
56. Penny Creek
57. Rice Chimney at Willtown Bluff
58. Buzzard's Island Shell Ring
59. Crow Island Shell Ring
60. Accreted Beach at Sullivans Island
61. Spruce Pine-beech Community, January 1995, Edisto Spruce Pine Natural Area
62. Aerial View of Black Island, 1994
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